Construction and Maintenance

Engineering and Highway Departments

State Aid for Street Construction

A RECENT survey by the *Oklahoma Municipal Review* shows that 25 of the 48 states give financial aid in the construction and maintenance of trunk-line highways routed through the cities and towns of those states. Following is a short résumé of the amount and sources of state aid in 23 of the states:

Alabama.—Cities receive 20 per cent of the license fees collected within the city.

Arkansas.—The state pays 50 per cent of the cost of trunk-line highways, based on an 18-foot width through cities and incorporated towns.

California.—Counties contribute from motor-vehicle funds a portion to cities for paving within their boundaries.

Connecticut.—Towns on the state aid system each receive a maximum contribution of $7,000 from the gasoline tax and registration fees.

Illinois.—The state can build and maintain roads through cities and towns, with the exception of Chicago. The work is done by the state.

Indiana.—One fourth of 1 per cent of all state receipts are distributed to cities on a property basis.

Iowa.—Cities receive $200 per mile for primary routes. In cities of less than 2,500 population the cities maintain these routes.

Kansas.—Cities of the first and second classes receive $250 per mile of state roads.

Maine.—On primary roads the town receives $60 per mile for maintenance for all mileage improved on this system to which the state has contributed to the cost. On secondary roads the towns pay $30 per mile maintenance on improved sections, and on third class highways each town may have one such highway for which the state appropriates funds for improvement. Construction is financed entirely by the state.

Maryland.—Twenty per cent of state bonds, license fees and gasoline tax collected in the state is allotted to Baltimore County.

Massachusetts.—In state aid highways which are connecting links between cities and towns, each of the three authorities, town, county and state, pays one-third of the cost. This does not include town streets which carry purely local traffic.

Michigan.—Cities receive $2,000 per mile of state road within the city limits.

Minnesota.—Cities and towns receive reimbursement for 20-foot widths of pavement passing through the corporate limits.

New Hampshire.—The towns' share of the construction cost is based on valuation. The maintenance share is fixed by the state and must not exceed 30 cents on each $100 valuation. The town cooperates with the state up to $875 per year. The towns receive from the state $90,000 per year.

New Jersey.—The state allots funds for the construction of trunk lines through cities.

New York.—One-fourth of the motor-vehicle license fees collected within the counties comprising New York City is allocated to the municipality.

North Dakota.—The state allocates funds for the construction of trunk lines on the Federal aid system through cities. The work is done under state supervision.

Ohio.—Cities receive 50 per cent of the license fees and 30 per cent of the gas tax collected within cities for the construction of through highways 20 feet wide. Any additional width is paid for by the city, and construction is supervised by the state.

South Carolina.—The state builds and maintains trunk lines through towns of less than 2,500 population.

Tennessee.—The cities receive a share of the license fees and gasoline tax expended on state highways through cities and towns. The construction and maintenance of the roads is under state supervision.

Virginia.—The state builds and maintains highways through towns of less than 3,500 inhabitants.

Washington.—The cities receive $500 per mile of state road through the municipalities.

Wisconsin.—The cities receive a share of the license fees and gasoline tax, amounting to $300 to $500 per mile of state road within the cities, and from $25 to $200 per mile of city streets not a part of the state or county road system.

Paving a Trail in a County Park

FORTUNE LAKE PARK, the Indian name of which is Be-wa-bic, is a large tract of land four miles from Crystal Falls, Iron County, Mich., which was purchased a few years ago for a public park by the County Commissioners. The park is heavily timbered with virgin forests, and a beautiful body of water known as Fortune Lake is included within its boundaries. A main trail about 14 feet in width traverses the center of the park. The trail was maintained satisfactorily by periodical surfacing with trap chips until the increased traffic caused so much dust that the Road Commission found paving to be necessary. The existing roadway surface, which contained an adequate thickness of compacted trap chips, was brought to true cross-section by blading with an 8-foot power grader. Clean, crushed trap from 1½ to 1¼-inch in size was obtained from the county quarry and spread to a depth of about 2½ inches. The spdeanig was finished with the power grader.

About ¾-gallon per square yard of water was used to dampen the rock, and then Bitumuls HRM was applied at the rate of ¾-gallon per square yard. The power grader was used for mixing. The asphalt emulsion coated aggregate was bladed from the sides to a center windrow, from which it was spread uniformly over the road surface. Two trips of the grader on each side resulted in excellent mixing. Following this, ¾-gallon per square yard of the Bitumuls was applied, and after it had fully set, in about three hours, the roadway was thoroughly rolled with a 10-ton roller. Stone chips from ¼-inch to 40 mesh were spread at the rate of 20 pounds per square yard. The surface was then broomed and thoroughly rolled, and the road was opened to traffic.

Repairing Cuts on Paved Streets in Allentown, Pa.

THE city ordinances of Allentown require that the public utility or other corporation or individual which must make a cut in a city street where the repair or installation of subsurface work is to be done must secure a permit. The replacing of the pavement surface on brick, concrete and tar and asphalt macadam streets is done by city forces. The cost of the permit of the individual or corporation making the cut is $4 per square yard on brick streets plus the cost of new brick, $6 per square yard on concrete streets, and $2 per square yard on oil-bound macadam streets, plus 10 per cent for overhead. On streets surfaced with sheet asphalt, asphaltic concrete and other permanent black tops, the replacing of the cut is done by contract. In the contract made May 5, 1931, the charges shown in the following table were accepted. These contract costs plus 10 per cent constitute the charge made against the individual or utility making the permanent cut which must be repaired.

			Unit Costs
Concrete base	6	inches thick	$1.55 sq. yd
Concrete base	8	" "	2.00 " "
Bituminous base	3	" "	1.25 " "
Sheet asphalt pavement	2½	" "	1.40 " "
Sheet asphalt top surface	1	" "	.80 " "
Sheet asphalt top surface	¾	" "	.75 " "
with paint coat			
Binder mixture			4.80 ton
Binder placing and rolling			.10 sq. yd.
Top surface mixture			7.75 ton
Top surface mixture placing and rolling			.16 sq. yd.
Heater work			.15 " "
Paint coat			.07 " "

EARLE W. MECKLEY,
City Engineer.

See the 1932 Municipal Index for five important articles on Street and Road Construction and Maintenance.

COLUMBUS discovers some new ideas in elevated tanks

COLUMBUS, Ohio, is the latest American city to join the small circle of those who boast a 2-million-gallon elevated water tank. This thriving metropolis of nearly 300,000 population has not only provided adequate storage capacity in its new tank—it has selected the type of structure with great care and has embodied features new in this construction.

For a tank of this size the Horton radial-cone-bottom type has important advantages over other designs. One of its chief merits is its flexibility. Any combination of capacity and depth of tank is possible with this design, making it particularly attractive for large capacities and small range of head between a full and empty tank. The Columbus tank is not a shallow tank because a small range of head was not necessary. But this design would permit a capacity of 2 million gallons to be provided within a range of head of 20-foot instead of the 50-foot used in this case.

The city of Columbus also found that attractive appearance could be attained in a large tank without excessive cost for ornamentation. The shape of bottom and roof was carefully worked out to give pleasing proportions and lines without waste. The customary eave is eliminated and the ellipsoidal roof joins directly to the tank shell, and the high water line is twelve feet above the ordinary eave line. The bottom holds 330,000 gallons of water, and space in the roof is utilized for the storage of 470,000 gallons.

A complete description of this latest development in Horton tanks will be supplied gladly by our nearest office together with estimating data on tanks of any type or size in which you are interested.

CHICAGO BRIDGE & IRON WORKS

Chicago.....2127 Old Colony Bldg.
New York....3108 Hudson Terminal Bldg.
Cleveland.....2236 Midland Bldg.
Detroit.....1501 Lafayette Bldg.
Philadelphia.2616 "1616" Walnut St. Bldg.
Boston.....1501 Consolidated Gas Bldg.
Birmingham.....1502 Fiftieth St., N.
Dallas.....1206 Burt Bldg.
San Francisco.....1033 Rialto Bldg.
Seattle.....4343 Smith Tower
Houston.....1101 Electric Bldg.
Tulsa.....1425 Philcade Bldg.
Los Angeles.....1303 Pacific Mutual Bldg.
Havana, Cuba.....Apartado 2507

Fabricating plants in Chicago, Birmingham, and Greenville, Pa.

HORTON TANKS

Pure Water—Man's Greatest Need

Items on Water Supply and Purification

Tastes Due to Chlorination of Water

IT is quite important when water is disinfected with chlorine that the operators make careful record of the occurrence of disagreeable tastes and odors in the treated water, because no water treatment plant is entirely satisfactory when water of an unpleasant physical nature is produced, even though it is of a safe sanitary quality. Tastes in chlorinated water are usually due to one of three causes; (1) the presence of excessive amounts of residual chlorine; (2) the reaction of phenol or carbolic compounds with the chlorine added to the water; and (3) the reaction of the chlorine with organic matter or with oils liberated by micro-organisms, or with the decomposition products of such organisms.

Tastes due to excessive amounts of residual chlorine can be easily avoided by reducing the chlorine dose, if this can be done without lowering the efficiency of chlorination. If effective chlorination cannot be obtained without the production of free chlorine tastes in the treated water, improved preliminary treatment is necessary in order that treated water of satisfactory physical quality may be produced. If improved preliminary treatment is not economical, requiring the construction of costly filtration plants, etc., it may be feasible to utilize the process known as superchlorination, which involves the use of relatively large chlorine doses to sterilize the water, followed by the application of sodium thiosulphate, sodium sulphite or sulphur dioxide to remove the excess chlorine dose after a suitable disinfection period has elapsed. This process is especially valuable when alkaline waters have to be chlorinated, because experience has shown that such waters in most cases cannot be treated with large doses of chlorine without the production of tastes. This situation is apparently due to the fact that the chlorine reacts with the alkali in the water to form hypochlorite, which persists much longer than would residual chlorine itself. Water from the Great Lakes has shown this characteristic, and the permissible chlorine doses are thus restricted. The softened water at Dallas, Texas, also has a noticeable taste after chlorination. The formation of this taste was prevented by decreasing the lime dose in order not to form normal carbonates necessary for the formation of stable hypochlorites.

From a discussion in "The Protection and Chlorination of Public Water Supplies," issued by the Division of Sanitation, New York State Department of Health.

Reservoir Used for a Park

THE roof of the Beverly Hills, Calif., city reservoir has been transformed into a park. A well-kept lawn covers the roof, and trees and shrubbery are planted around its rim. Realizing the possibilities of using the reservoir area for park ground, city planners put this scheme into effect.

The area of the reservoir is only 1.3 acres, while that of the park is 3 acres. In the center of the artificially created park grounds is an electrically illuminated fountain, and cement benches are scattered about the park.

The roof of the 8,000,000-gallon concrete covered reservoir is a series of barrel arches with 10-foot spans, made of 3-inch Gunite. The arch rise is 1 foot in the 10-foot span. Tile drains lie in the valleys between the arches, over which 2 feet of soil has been placed. The soil is only 12 inches thick on the crowns of the arches, but is at least 2 feet in depth in other portions of the park.

As the temperature of the water in the reservoir is uniformly about 70 degrees, the lawn over the entire area is kept in almost perfect condition during the winter.

CLYDE KIMBALL,
Water Works Superintendent, Beverly Hills, Calif.

The Service of Service Pipes

OF the many elements forming the various parts of a water-works system, service pipes seem to be the least standardized. The problem of selecting suitable material for service connections is a real one in Minnesota when it is considered that, for the most part, connections are made quite deep, that is, practically 8 feet, and that they are covered by a heavy, expensive pavement which can be more or less damaged by a defect in the service. All water-works officials understand how costly the waste of water is, as well as the making of repairs. Aside from the practical and physical features of the service connections, the corrosiveness of the material and its effect upon health are also to be taken into consideration. Various metals have been used, and all have been more or less satisfactory.

Experience at Saint Paul has been as varied as in almost any other city. For many years extra-strong lead with brass fittings was used almost exclusively. In time, the 2-inch size began to give trouble due to the fact that the lead did not have tensile strength enough to resist bursting pressure. Galvanized iron was then substituted and was used for many years almost exclusively for the 2-inch, although lead continued to be used for the 1½-inch and smaller sizes. The galvanized iron pipe had a life considerably longer that that of black iron; however, it corroded rather badly and its average life was not longer than fifteen years.

In order to better this service, when cast iron pipe was to be had in the 2-inch size, its use was adopted, but some trouble was met, and exceptional care was needed in handling to keep the pipe from breaking. It was then decided to try brass pipe. It was practically impossible, however, to thread the pipe and get tight-screwed joints at all times. Finally, copper tubing was tried and was found to be the most satisfactory of any material yet used. It is now being used for all sizes 2 inches and smaller.

Copper tubing can be had at much less cost per foot than the same size in lead, and is made by several companies; therefore, it is readily available at competitive prices. The service connection can be made up of one or more pieces of the copper tubing, and the connection to the corporation stop and curb stop, as well as the splices, can be made either with a solder wiped joint or a flanged union joint. The various fittings going with the copper tubing can be had from two competitive companies, so there is no risk of paying exorbitant prices.

We have also experimented with the freezing of the copper, and find that it will stretch sufficiently for at least two times to prevent the pipe from splitting. This is also the case with lead pipe.

LEONARD N. THOMPSON,
General Superintendent and Engineer, Water Department, St. Paul, Minn.

Municipal Ownership of Water Plant Reduced Typhoid Rate

THE transformation of the polluted Missouri River water to a pure domestic water under municipal ownership of the Kansas City, Kans., water works, is best illustrated by the health records comparing the death rate from typhoid fever at the time the city acquired the property in 1909 with the 1930 death rate from typhoid.

The death rate from typhoid fever per 100,000 in 1909 was 42.4; this had dropped to 1.8 per 100,000 in 1930. The number of lives saved in 21 years between 1909 and 1930 by this reduction in typhoid death rate is 852. The total number of consumers in 1930 was 27,698, while there were only 6,350 consumers in 1909.

JAMES D. DONOVAN,
Manager of Production and Distribution, Board of Public Utilities, Department of Water, Light and Power, Kansas City, Kans.

RIGID TEST

The shop testing to which Allis-Chalmers Centrifugal Pumps are subjected is insurance to buyers that these pumps will give the performance guaranteed. Testing facilities at Allis-Chalmers permit testing comparatively large size pumps as this 42″ x 36″, 42,000 g.p.m. at 20 ft. head, pump illustrates. This facilitates the obtaining of engineering data for continually improving designs. The purchaser of an Allis-Chalmers Centrifugal Pump, therefore, gets the double benefit of tested pumps that embody the latest and best features in design.

Allis-Chalmers Manufacturing Co., Milwaukee, Wis.

ALLIS-CHALMERS

During April we hope you will remember to mention THE AMERICAN CITY

CHARLES H. BLIVEN
Supt., Water Supply Division
Norfolk, Va.
(Appointed 1918)

ROBERT COLEMAN
Manager, Water Works
Selma, Ala.
(Appointed 1918)

E. R. SMITH
Supt., Water Dept.
Bedford, Ohio
(Appointed 1920)

HOWARD E. WOLBERT
Supt., Board of Water Supply
Mt. Vernon, N. Y.
(Appointed 1922)

EDGAR C. BRANTLY
Mgr., Water, Gas & Electric Depts.
Danville, Va.
(Appointed 1927)

Who's Who in Water Supply

The 51st of a Series of Portraits of Water-Works Officials Which Has Appeared Monthly Since January, 1928

EDWARD F. MORGAN, JR.
Supt., Public Works
Hudson, Mass.
(Appointed 1925)

E. F. DUGGER
Gen. Mgr., Water Works Commission, Newport News, Va.
(Appointed 1926)

WILLIAM S. PATTON
Mgr., Water Works
Ashland, Ky.
(Appointed 1918)

RICHARD F. WAGNER
Director, Water Dept.
Lynchburg, Va.
(Appointed 1920)

RAY CROZIER
Supt., Water Works Co.
Peoria, Ill.
(Appointed 1913)

JAMES BEDELL
Supt., Board of Water Commrs.
Ossining, N. Y.
(Appointed 1903)

EDWARD R. HANS
Supt., Light & Water Works
Bluffton, Ind.
(Appointed 1924)

BEN R. DOUGHERTY
Supt., Richmond Water & Light Co., Richmond, Ky.
(Appointed 1903)

BARNEY BROWN
Chief Engr., Hot Springs Water Co., Hot Springs, Ark.
(Appointed 1920)

AUSTRALIA and COLAS
In Old SPAIN . . and PORTUGAL too
COLAS modernizes ancient highways
COLAS TRIUMPHS IN FRANCE
The trend to modernism in HIGHWAY CONSTRUCTION extends to SOUTH AFRICA
COLAS ROADS set a new pace in the FAR EAST
In London . . . COLAS HIGHWAYS best serve the demands of modern traffic
Buenos Aires the City Beautiful
. . . . COLAS on the FERGUSON HIGHWAY
FACTS
. . . not Claims!
PURE ASPHALT . . .
APPLIED COLD . . .
APPLICATION EASY . . .
SAVES TIME . . .
COMPLETE PENETRATION . . .
ECONOMICAL . . .
Colas Roads everywhere are proving conclusively the EXTRA SERVICE in every mile!

. . around the world on COLAS ROADS

Colas is the ideal method of applying a high quality asphalt binder. Colas is pure asphalt emulsified, providing better roads at lower cost. Its rapidly increasing use by highway engineers all over the world is proof of its qualities.

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SHELL PETROLEUM CORPORATION
ST. LOUIS

SHELL EASTERN PETROLEUM PRODUCTS, INC.
NEW YORK CITY

Licensees of Colas Roads, Inc., New York City

COLAS REG. TRADE MARK

BUILDS DURABLE LOW-COST ROADS

Sewage Treatment Means Clean Streams

SEWERAGE and SEWAGE DISPOSAL

Standards for Manhole Frames and Covers

A PROPOSAL for an American standard for manhole frames and covers, containing recommendations for 13 types of frames and 7 types of covers to replace the thousands of types now in use, has recently been published by the American Standards Association, sponsored by the American Society of Civil Engineers and the telephone group. The demand for many different designs and sizes of openings for manholes by the various public utilities and municipal departments which make use of manholes for their underground pipes and lines has caused difficulties in manufacture and replacement of manhole frames and covers. The present concerted effort to standardize on a few sizes and styles is the result of this situation.

The proposed standard includes drawings showing designs and dimensions for the 13 types of manhole frames and the 7 types of manhole covers which are recommended. The draft also includes specifications for hydrant and service-valve boxes. Specifications are given for the gray-iron and carbon-steel castings to be used in the manufacture of manhole frames, covers and boxes. Standard methods of test are provided by which both manufacturers and purchasers can determine compliance with the specifications. In the discussion the report says, "In one city alone having a population of about 500,000, it is estimated that there are at least 100 different types and sizes in use." A single foundry in another city reports that it has about 2,000 different sets of patterns for manhole frames and covers, and nearly 600 of these sets of patterns are listed as being active at the present time. The great majority of these differences in type and size cannot be justified on any logical basis. Some manhole covers in use today are square while other are rectangular; many of them are round, and some have been noted that are elliptical in shape. In one of the general shapes a great many types and sizes are produced, owing to different ideas in regard to details of design such as ribbing, holes for lifting hooks, dimensions and pattern of the top of the cover.

Obviously, this is a field in which there is considerable to be gained through simplification and standardization. For example, breakage due to insufficient metal, poor quality of metal, and non-uniform distribution of metal, could be eliminated; special core work and other increased costs of molding to care for unnecessary features that have been introduced into what was previously a good practical design, would not be necessary; duplication of patterns and increased pattern costs where slight and unnecessary changes in design necessitate a new pattern would be things of the past; and waste of metal where castings are made too heavy would not occur.

In addition to all the advantages obtained through the elimination of these undesirable features, the standardization of the relatively few necessary types and sizes would permit greater quantities of castings to be contracted at one time and the consequent lowering of costs. Where there is a continued demand for the same types and sizes of castings, manufacturers do not hesitate to carry a reasonable stock, and the manufacture of these stocks can be carried on during dull periods, thereby helping to keep men employed and at the same time reducing overhead expense.

Copies of the draft are available from the American Standards Association, 29 West 39th Street, New York.

Financing of Sewage-Works Operation

ONE of the most important matters affecting the successful operation of sewage works is proper funds for that purpose. Most sewage works owned and operated by municipalities or other political subdivisions are financed out of the general tax levies. It is frequently the aim of those public officials who decide the amount of money to be appropriated for annual operating budgets, to keep the tax rate as low as possible. The result is that funds for the efficient operation of sewage plants are generally inadequate. In order to correct such conditions, attempts have been made to find some other practicable method of financing sewage-works operation.

The Legislature of the state of Ohio has passed a law which permits the council of any city or village in that state to establish by ordinance equitable rates or charges for sewerage service. It is provided in the Ohio law that these rates are to be paid only by those persons who are served by the sewerage system. In Ohio a number of the smaller cities, including Delaware, Oxford and Salem, and the large city of Dayton, have passed the necessary ordinances as a result of this law.

The committee of the Sanitary Engineering Division, American Society of Civil Engineers, on sewage operations and control reported that it believes that as far as practicable the maintenance and operation of sewage works as well as the tributary sewerage systems should be financed by funds collected from the persons or property owners who are benefited. These funds should be levied in the form of rent payable at stated intervals, and should be used only for the maintenance and operation of the sewage works and the sewerage system. The financing of the cost of construction of sewage works should be borne by the entire community benefited.

The Operation of Sludge Beds

PROBABLY the weakest and most undersized member of the average sewage plant is the sludge bed. Sludge beds should be of ample size, of ample depth, of proper material and well underdrained. If the bed is too small, the dose of sludge will be too thick and slow drying; if the bed is thin, the sludge will invariably work down to the underdrain, which will necessitate digging up the drains and then rebuilding the bed; and if insufficiently underdrained, the bed will be sluggish and will clog.

The sludge drying bed must be preserved in good condition by keeping it in a deep porous condition with fine material, sand or fine cinders on top to prevent the sludge from working down into the bed. It must be thoroughly cleaned after each use, for a fresh dose should never be run onto old sludge on the bed.

Poor sludge may be materially improved by the application of a solution of alum or ferric chloride to the sludge as it is drawn from the tank. Such an application coagulates the colloidal suspensions in the sludge, thus releasing the water and permitting it to drain away.

When you draw sludge remember this: have your bed in good condition and know what kind of sludge you have to draw. Then do not put on the bed any more than will dry in a reasonable time, or else the bed will be tied up under a sludge pond forever and a day. Several thin doses can be dried and removed from a bed in the time it takes to dry a dose too thick to drain properly. It frequently happens that just when a dose will not drain properly, the bed is urgently needed. This necessitates handling only partially dried sludge, which is a very costly and often a nuisance-producing process. In the use of glass-covered beds, pay particular attention to ventilation. Water does not evaporate from a stoppered bottle.

F. E. DANIELS,
Chief, Industrial Waste Section, Sanitary Water Board, Pennsylvania State Department of Health.

Read These Articles in The 1932 Municipal Index:

"Sewer Rentals or Charges for Sewerage Service"

"Sewage Disposal for the Small City"

STOP
GERM-SPREADING

Many vital improvements have been made in drinking methods, but, heading the list, is the R-S Vertico-Slant Sanitary Fountain—an advantage which stops germ-spreading.

This fountain never feels the touch of contaminated mouths and lips. It prevents them from even coming close to the jet that spouts the water.

The Vertico-Slant with the water passing angularly from jet to mouth makes each drink a safe and sanitary one. Write for bulletin.

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RUNDLE-SPENCE

L. E. DEMPSEY
Supt. of Sanitation
Greensboro, N. C.

MARK BOWEN
Supt., Dept. Public Works and Engineering
Dearborn, Mich.

OLAF SKRAMSTAD
County Highway Engr., Otter Tail Co., Fergus Falls, Minn.
(Appointed 1923)

WALTER W. GRAF
City Engr., Lancaster, Ohio
(Appointed 1918)

J. C. McALLISTER
Supt., Sanitary and Street Depts.
Fayetteville, N. C.

Who's Who among Sanitation Officials

One of a Series of Portraits of Engineering Officials Which Has Appeared Monthly Since April, 1928

PETER H. GLANNAN
Supt., Commonwealth Water Co.
West Orange, N. J.
(Appointed 1913)

CHARLES H. WELLS
Chief Engr., Dept. of Public Service, Newark, Ohio
(Appointed 1902)

J. FRANK BOWEN
City Engineer
Manchester, Conn.
(Appointed 1913)

R. A. DAHMS
County Highway Engr., Cass Co.
Walker, Minn.
(Appointed 1923)

HARRY F. HARRIS
County Engr., Mercer Co.
Trenton, N. J.
(Appointed 1917)

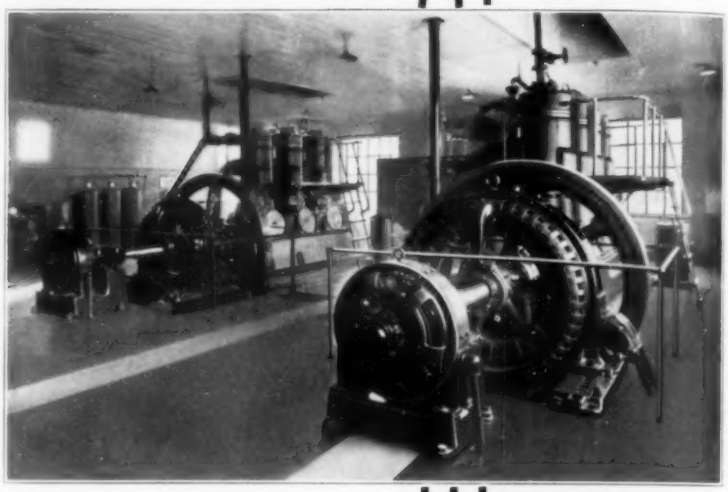
W. FRANKLIN BUCHANAN
County Engr., Middlesex Co.
New Brunswick, N. J.
(Appointed 1927)

JOHN M. POWELL
City Engineer
Elyria, Ohio
(Appointed 1919)

CLAIR J. SWIFT
County Highway Engr., Blue Earth Co., Mankato, Minn.
(Appointed 1926)

IRVING BACON
County Surveyor, Fillmore Co.
Preston, Ill.
(Appointed 1927)

F-M Diesels *save* $750 *per month*



Engine room of the Sullivan, Illinois, municipal plant showing two of the F-M Diesels. It's one of the best equipped and neatest plants in the State.

Sullivan installation pays for itself and earns substantial net surplus

In 1927, the municipally-owned electric light and power plant of Sullivan, Illinois, changed from steam to Fairbanks-Morse Diesel equipment. Two F-M Diesel generating sets of 180 and 240 hp. replaced two obsolete steam engines.

The improvement in service made possible by this change resulted in a steady increase in the load. In 1928, it was necessary to install an additional unit to take care of the increased demand. This last unit, with capacity of 360 hp., gave the plant a total capacity of 780 hp.

Immediately following the change from steam to F-M Diesel Engines, savings on fuel, labor and repairs amounted to approximately $750 per month, which paid for the engines in a remarkably short time.

Gross receipts of the plant for the fiscal year ending in May, 1930, were sufficient to return a substantial net surplus to the general fund, after all operating costs *and the payments on the 360-hp. engine* had been deducted.

Why not determine what F-M Diesels can accomplish for *your* city? The services of a Fairbanks-Morse engineer are at your disposal for consultation on your specific problems. Literature upon request. No obligation.

FAIRBANKS, MORSE & CO.
900 S. Wabash Ave., Chicago
32 branches at your service throughout the United States

Fairbanks-Morse Diesel Engines are giving dependable, low-cost service in the following municipalities:

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Falls City, Nebr.
Herington, Kans.
Slater, Mo.
Augusta, Kans.
Sullivan, Ill.
Lewes, Del.
Hearne, Texas
Harrisonville, Mo.
Tecumseh, Nebr.
Sebewaing, Mich.
Plaquemine, La.
Covington, Tenn.
Duncannon, Pa.
State Center, Iowa
Wickenburg, Ariz.
Goshen, Ind.
Blooming Prairie, Minn.

FAIRBANKS-MORSE
diesel engines
25 to 1400 Horsepower

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METHODS and COSTS of REFUSE COLLECTION and DISPOSAL

The Christmas Aftermath at the Municipal Incinerator

AS America has the Grand Canyon for its old razor blades, so Providence, R. I., has the municipal incinerator for its Christmas trees. That needled pinnacle of green and tinsel and bright ornaments which appeared in the front room some time on the night before Christmas was just one quick "pfftt" when it was shoved through the fire-doors of the incinerator. Whole forests of Christmas trees, thoroughly dried out and hence satisfactorily combustible, were eaten up by the incinerator daily. Although it did not seem quite right, the incinerator began to receive Christmas trees for burning on Christmas eve. They came from dealers who were unable to dispose of their stocks. After the initial burst of flame, things quieted down until after New Year's Day. On January 9 the trucks were bringing in nearly 1,000 trees daily, and they continued to do so until well into February.

A year ago, the Kinsley Avenue incinerator burned up more than 50,000 trees, hundreds of wreaths of holly and whole truckloads of Christmas wrapping papers. This year the load was even bigger. Lots of trees came in fully trimmed, the people not having taken the trouble to put the strings of tinsel and the fragile ornaments away for next year. The incinerator operating personnel did not have time to remove the trimmings, so in they went just as they were received at the plant. Although the burning of the Christmas trees was at its peak early in January, it will continue, judging by last year's experience, until June. It is not known exactly why people keep Christmas trees until June, but it is thought that they may put them in the yards for decoration or under the front porch and then forget about them.

The incinerator crew puts the trees into the fire pit where the refuse is burned. The trees go in butt end first, there is a lively crackle, a burst of flame and then nothing but a skeleton of a tree left to burn at a slower rate. The trees are so full of sap that they tend to clog the grates, hence, during the Christmas season the fires have to be dumped every two hours instead of every three hours, as is customary. The trees seem to be of little or no value in helping to burn the refuse.

In getting the trees out of the way, the Incinerator Department has the active and moral support of the Fire Prevention Bureau, of the Providence Fire Department, and of the Providence Safety Council. Christmas trees standing for days in a heated room get very dry; it does not take much to set them on fire and it is best to get them out of the way.

IRVING STONE,
Superintendent, Incinerating Plant, Department of Public Works.

Brockton, Mass.

In Brockton, population 63,797, all garbage is collected by the city, using eight wagons and five 1-ton motor trucks. The garbage is disposed of by feeding to swine.—WILLIAM BAMFORD, Overseer, Department of Public Welfare.

Brookline, Mass.

The town of Brookline, population 47,490, which is completely surrounded by the city of Boston, collects all garbage within town limits by municipal equipment, which includes six 5-ton Mack trucks with 5-yard bodies. The garbage is disposed of by feeding to hogs.—DANIEL G. LACY, Superintendent of Streets.

Everett, Mass.

The city of Everett, population 48,073, pays a contractor to collect garbage throughout the city. He uses four 2-horse 7- to 8-cord-foot wagons and two 4-cord-foot motor trucks. The garbage is disposed of by plowing under for use as a fertilizer. Two trips are made daily to the disposal site.—THE BOARD OF HEALTH.

Fitchburg, Mass.

A contractor is paid by the city of Fitchburg, population 40,692, to collect all of the garbage, using three 3-ton trucks with 12 x 6 x 2-foot bodies. The garbage is fed to pigs for disposal.—FRED. R. BRIGHAM, Agent, Board of Health.

Greenfield, Mass.

A contract is made with an individual by the city, population 15,500, for the collection of garbage. He uses one wagon with a 10 x 3 x 2-foot body, two Mack trucks with 12 x 5 x 2½-foot bodies, and one Chevrolet truck with an 8 x 4 x 2-foot body. The garbage is fed to hogs as a means of disposal.—GEORGE P. MOORE, Health Agent.

Royal Oak, Mich.

The city of Royal Oak, with a population of 22,904, handles all of its garbage collection with municipal motor equipment, which includes two 1½-ton Chevrolet trucks with 1½-yard bodies and one 1½-ton Ford truck similarly equipped. The garbage is taken from the city by an owner who hauls to his own piggery at no cost to the city.—E. M. SHAFTER, City Engineer.

St. Paul, Minn.

Approximately one-half of the garbage in St. Paul, population 271,606, is collected by the city, and the other half by farmers, who use the garbage for hog feeding. The farmers use trucks and are not paid by the city for their services as scavengers. The city uses fourteen 2½-yard trailers for collection. All of the garbage is disposed of by feeding to hogs.—I. E. GOTTLIEB, Superintendent of Sanitation.

Vicksburg, Miss.

The city of Vicksburg, population 22,943, collects all of the garbage within the corporate limits, using fourteen carts with 5-foot x 3-foot 6-inch x 2-foot bodies, and one 3-ton truck with a 9-foot x 6-foot x 30-inch body. The garbage is disposed of by filling in ravines and covering over with dirt, for Vicksburg is a very hilly community. Trucks and carts follow the street flusher, picking up all rubbish, also all cold ashes, and tree limbs, shrubbery, leaves, etc.—D. P. KENNEDY, Sanitary Officer.

St. Joseph, Mo.

The city of St. Joseph, population 80,935, makes no arrangement for the municipal collection of garbage. It is handled entirely by a private collector paid by the householder. In this service there are ten 10 x 3-foot wagons and two 5-ton, two 3-ton and one 2-ton motor trucks. The garbage is disposed of by hog feeding.—JOHN R. BENDER, Clerk, Board of Health.

Helena, Mont.

The city of Helena, population 11,803, collects garbage with municipal equipment throughout the city. The collection equipment includes four 2-yard wagons and one 2½-yard truck. The garbage is disposed of on the city dumps.—THOMAS C. PATRICK, Councilman.

Kalispell, Mont.

Garbage throughout the city of Kalispell is collected by a contractor paid by the city, population 6,094. The contractor uses one motor truck and collects once a week in the residential district, except during the five summer months, when collection is made twice a week.—EDWARD DICKEY, City Clerk.

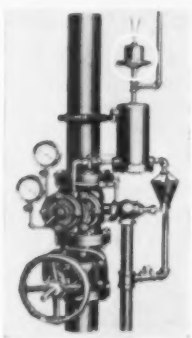
Lewistown, Mont.

A private collector paid by the householder collects garbage in Lewiston, population 5,358. He uses several types of motor trucks and disposes of the garbage at a dump under city supervision.—RAY B. HAIGHT, Sanitary Officer.

GAMEWELL SPRINKLER WATCHMAN

supervises
2604 SPRINKLER HEADS
in new
WESTERN ELECTRIC WAREHOUSE

This is the **Sprinkler Watchman** which automatically sends an alarm to the municipal fire department when a sprinkler head goes off. An alarm can also be manually transmitted as shown, by a person discovering a fire before the sprinklers operate.



Circuit opener (encircled) on this Rockwood sprinkler valve connects the sprinkler system with the Gamewell **Sprinkler Watchman.**

IN this modern warehouse just erected at Watertown, Mass., by the New England Telephone & Telegraph Company and occupied by the Western Electric Company, 2604 sprinkler heads which make up three wet and one dry pipe sprinkler systems, are constantly supervised by a Gamewell *Sprinkler Watchman.*

The Gamewell *Sprinkler Watchman* is the simplest, quickest, most reliable and least expensive of all forms of sprinkler supervision. It consists simply of:

1. A Gamewell municipal fire alarm box (master model)
2. A circuit opener for each sprinkler riser valve
3. A pressure pump of the hand or automatic type (needed only on wet pipe systems)

When a sprinkler head goes off, the flow of water operates the riser valve of the sprinkler system, which in turn causes the circuit opener to trip the fire alarm box, and the latter transmits its signal *directly* to the municipal fire department.

Municipal officials should offer *Sprinkler Watchman* protection to the business concerns in their cities. They are the heavy taxpayers—contributing most toward the operation of the fire department. Furthermore, they are the lifeblood of your community. Serious fire or water damage would badly cripple any of them or perhaps drive it out of business, thus seriously affecting the prosperity of your city.

Any fire chief will convince you of the value of a prompt alarm. Through the installation of *Sprinkler Watchmen* you can make every sprinkler head in your city a fire department nerve that will automatically notify the fire department when a fire starts. Hundreds of *Sprinkler Watchmen* are now in service in all parts of the country.

An alarm can be sent manually from any floor of a building through one of these Remote Control Stations connected with the **Sprinkler Watchman.**

Let Gamewell Fire Alarm Boxes

Keep an Eye on the Sprinkler Systems of Your City

THE GAMEWELL COMPANY
NEWTON, MASSACHUSETTS

Police—Fire—Safety Items

of Interest to Departments of Public Safety

Police and Fire Broadcasting Systems in Many Cities

BOTH for sending out information on newly committed crimes to police "prowl" cars and for transmitting emergency alarms to fire companies, the use of radio by cities is spreading. Its employment for police purposes is the more popular. The Federal Radio Commission, as reported in the February issue of *Public Management*, gives 43 cities, two counties and three states as operating police radios, with ten other cities in possession of construction permits and twelve applications pending. The *New York Sun* for March 5 lists 83 police and fire radio stations as of March 1, including nine that are owned by five states, and five marine fire stations, as well as 69 city stations operating in 64 municipalities, as follows:

Bakersfield, Berkeley, Fresno, Pasadena, San Diego, San Jose, Tulare and Vallejo, Calif.; Denver, Colo.; Washington, D. C.; Atlanta, Ga.; Chicago, Ill.; Fort Wayne, Indianapolis, Kokomo and Richmond, Ind.; Cedar Rapids, Davenport and Des Moines, Iowa; Topeka and Wichita, Kansas; Louisville, Ky.; Arlington, Brookline and Somerville, Mass.; Detroit, Flint, Grand Rapids, Grosse Pointe, Highland Park and Lansing, Mich.; Minneapolis and St. Paul, Minn.; Kansas City and St. Louis, Mo.; Omaha, Nebr.; Auburn, Buffalo, New York, Rochester and Syracuse, N. Y.; Charlotte, N. C.; Akron, Cincinnati, Cleveland, Columbus, Dayton, Toledo and Youngstown, Ohio; Oklahoma City and Tulsa, Okla.; Portland, Ore.; Philadelphia and Pittsburgh, Pa.; Providence, R. I.; Memphis, Tenn.; Beaumont, Dallas, Houston and Fort Worth, Texas; Salt Lake City, Utah; Seattle, Wash.; Milwaukee, Wis., and Honolulu, Hawaii.

One of the new city installations is described below.

Auburn, N. Y., Adds Police Radio

WHEN the Police Department of Auburn, N. Y., was equipped only with the telephone call system, time was often lost, between report calls, in dispatching prowl cars to the point where needed. After much investigation, Chief Chester J. Bills was convinced that a radio-telephone system would solve the problem.

A short time later, the City Council decided to build a new central police and fire headquarters on the site of the 100-year-old City Hall, long condemned as unsafe. The plans for the police building made provision for the radio installation.

After months of investigation of the merits, initial cost and operating expense of the various equipment manufactured by the reputable radio companies as well as that designed by local radio engineering talent, a 7-A-50 De Forest radiophone transmitter, of 50 watts output, was purchased and installed by the electrical contractor who wired the building. The writer cooperated with the Chief in the investigation and tests.

The prowl cars are equipped with Stromberg-Carlson superheterodyne compact auto receivers. These cars follow schedules and routes so that at any time headquarters can dispatch one or more cars and get it to any point in the city in an average time of one minute of receipt of a complaint or alarm.

In the signal room the operator sits at the telephone switchboard, on which are all department telephones, call boxes and public trunk lines. Within reach of his right hand is the control operating the radio transmitter. By turning his head slightly he talks into the operator's microphone and give orders to all cars direct. A microphone and signal box is also located within reach of the Chief and of the Captain of Police. At the left of the operator is the indicating alarm panel, connecting all the banks, the City Treasurer's office and the state prison. Pushing any concealed button, cutting any wires or illegal entry to any of the banks will instantly indicate trouble and its location. Cars are dispatched to the indicated location, arriving before any outsider knows an alarm has been given.

Periodic tests are made with the prowl cars to indicate that the system is in good order. Upon any car failing to receive the test, it is driven to headquarters, the defective receiver easily removed and another complete tested receiver installed in less than ten minutes. The defective one can then be overhauled in the shop.

Police headquarters is also connected in the state-wide teletype system, which has proved a great help in police work.

Power from the transmitter is fed to a tuning unit located in the attic, by a two-wire radio-frequency transmission line, eliminating losses in an antenna running through the building to the transmitter. An electrically controlled lightning switch operates automatically when the transmitter is shut down, grounding the antenna.

A monitoring receiver is a part of the transmitter and is connected to loud speakers in the squad room and other parts of the building, automatically notifying all personnel of any alarms, as well as giving a check on speech quality and volume.

An automatic temperature- and crystal-controlled master oscillator governs the frequency of the emitted wave and holds it well within the requirements of the Federal Radio Commission.

One operator can handle the telephone switchboard and radiophone transmitter from one position.

CHAS. J. HEISER,
Radio Engineer, Auburn Police Department.

New York Police Will Conduct Sports Tournament as Crime Preventive

THE function of organized recreation as a wholesome means of release for youthful energies that might otherwise lead to delinquency and crime is recognized by the Crime Prevention Bureau of the New York City Police Department. Tentative plans for a city-wide athletic tournament, to be participated in by boys from 10 to 17 years old, have been announced by Inspector Louis F. Costuma, in charge of the uniformed police of the Bureau. Cooperation of the schools and of boys' clubs will be sought in connection with this project, which is expected to take place soon after the beginning of the summer vacation. Organized contests will first be held in each of the five boroughs, after which the winning teams will meet for the purpose of deciding the city championship.

For Fire Safety and Community Cleanliness

THE annual spring fire-prevention and clean-up campaign is being actively furthered in various quarters, particularly by the committee organized for that purpose by the National Fire Protection Association, which declares that this campaign has become a medium whereby all classes unite in a movement for civic improvement. It creates greater safety against fire and better sanitation and public health, and also provides opportunities for useful employment.

As a program for the spring Clean-up Week the following is suggested by the Cleveland, Ohio, committee:

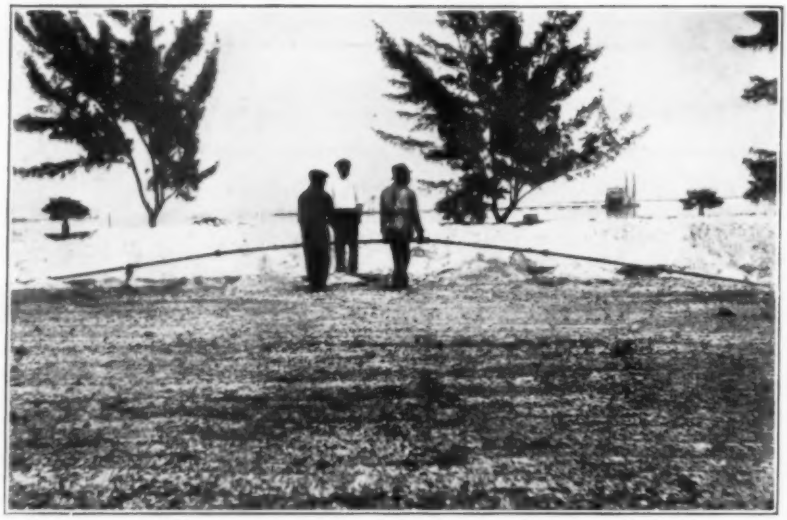
Monday—CLEAN-OUT DAY: Remove rubbish from house, yard, and alley; eliminate fire hazards.
Tuesday—NEIGHBORHOOD DAY: Report smoking chimneys, dirty streets and lots, rubbish piles.
Wednesday—ODDS-AND-ENDS DAY: Collect and bundle discarded clothing, shoes, furniture.
Thursday—PAINT AND REPAIR DAY: Fix up fences, stairs, porches; paint walls, woodwork, furniture.
Friday—CHILD HEALTH DAY: Make your home safe from flies, uncovered garbage, dirt and disease.
Saturday—BEAUTIFY YOUR YARD: Dig a garden, plant flower and vegetable seeds; take care of your lawn.

Information and assistance for conducting local campaigns may be obtained from the chairman of the N. F. P. A. committee, T. Alfred Fleming, 85 John Street, New York.

Small Colorado City Conducts Fire School

FIREMEN of Fort Collins, which stood first among Colorado cities for Fire Prevention Week activities in 1931, are adding to their proficiency by attending school. Chief T. P. Treadwell has laid out a general course in fire fighting and other duties of fire department members, using as a basis the course of the United States Bureau of Vocational Education. Classes are held six days a week, extending from January to September, with monthly examinations.

Use 2-inch cast iron pipe . . .



Use McWane cast iron pipe . . .

"Believe It or not—"

—the "limber" looking line shown being lowered into the trench above is *cast iron* pipe of McWane make, 2-inch size. Its amazing flexibility is due to two big McWane features: green-sand casting and McWane precalked joints. *Cast iron* is being used in this small size because McWane cast iron pipe *lasts* in every size.

McWane Features

18-foot laying-lengths, tapping collars that permit making "wet" taps at will after laying, flexibility of pipe and joints, choice of precalked or standard screwed fittings, make McWane pipe the outstanding small cast iron pipe.

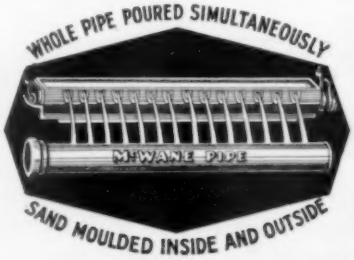
McWane bell and spigot pipe, with or without precalked joints, is made as large as 12-inches. 16-foot lengths in sizes above 3-inch. Modern, yet sand-cast, it combines the best features of both old and new types of pipe. Write today for data.

Easily Installed

Laying McWane cast iron pipe is swift and simple. You merely socket and calk. The lead joints are already in the pipe bells, ready to finish on the job. Or pipe is furnished with oversize male-and-female threaded spigots and bells, respectively.

Get *all* the facts about *all* the sizes of McWane Pipe!

McWANE CAST IRON PIPE CO. BIRMINGHAM ALABAMA



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APRIL, 1932

Vol. XLVI, No. 4

The American City

470 Fourth Avenue
New York

50 Cents, $4 a Year

Unique Layout on Restricted Site Features Filter Plant at Ossining, N. Y.

By ALBERT N. AERYNS
with
NICHOLAS S. HILL, JR.
Consulting Engineer, New York

THE village of Ossining, Westchester County, New York, has recently modernized its water system by constructing a new filtration, aeration and pumping plant at the source of supply on Indian Brook. The design involved unusual features of interest to water-works engineers and operators. The plant was constructed across a valley directly below the impounding dam in such a manner as to intercept and conserve an appreciable volume of seepage which formerly ran to waste. It has an elevated filtered water basin which also serves as a wash-water tank. The old pumping station, near the shore of Croton Bay about one-half mile from the dam and at a much lower elevation, was abandoned and its equipment transferred to the new plant without interruption of service. All treatment and pumping operations requiring constant attendance are now concentrated at a single point.

The Former Water-Supply System

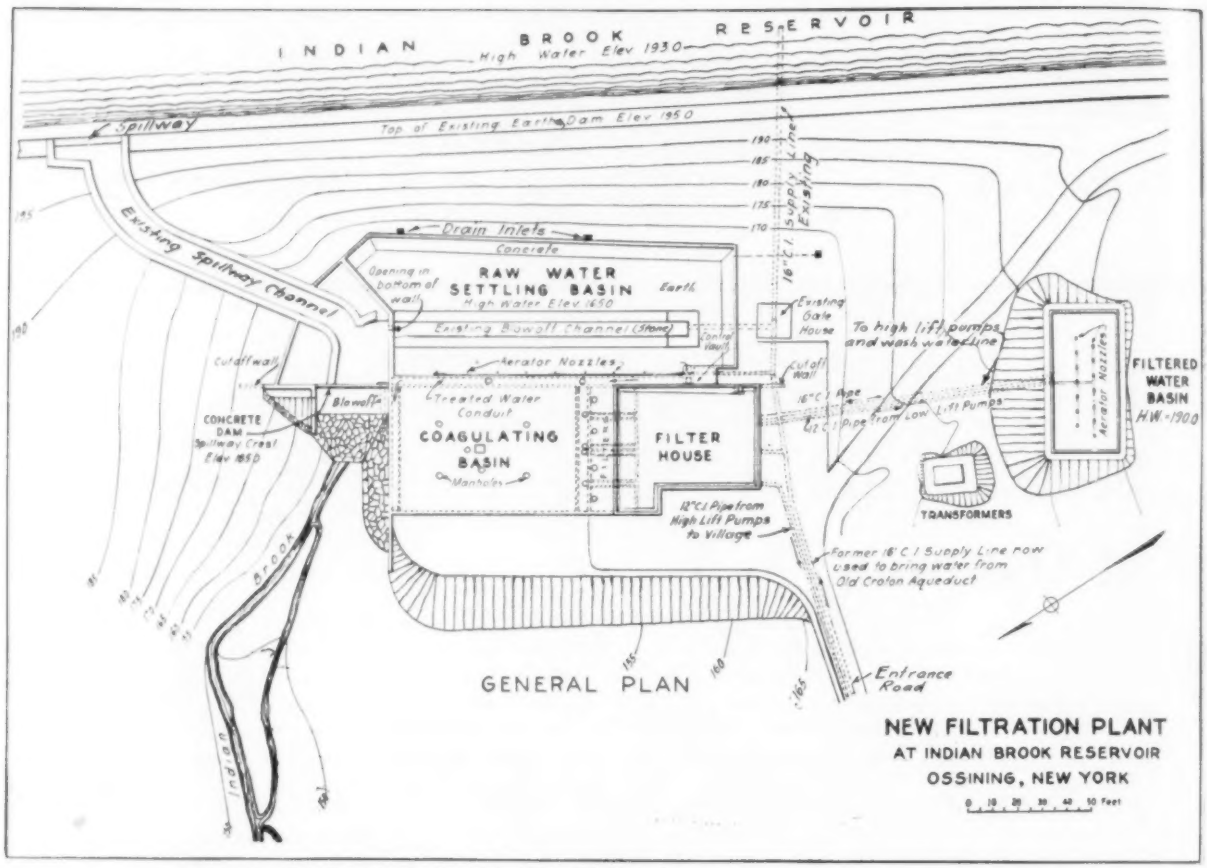
The controlling consideration which led to the improvement was the imperfect physical quality of the water derived from the reservoir upon which the village chiefly depends for its supply, but the conservation of seepage was also important. As long ago as 1914 the village was obliged to purchase a portion of its supply from the old Croton aqueduct of the city of New York, which crosses Indian Brook 800 feet below the dam. A report made at that time upon the best means of augmenting the yield from the local source revealed that recoverable seepage losses amounted to 30,000 to 300,000 gallons per day and possibly more, depending upon the stage in the reservoir. The New York water was expensive, but as the necessity for its purchase in appreciable quantities did not arise again until the recent drought, improvements were deferred.

Ossining is located on the Hudson River about 30 miles north of New York. The population is 16,000 and the average water consumption one million gallons per day.

The original water works were constructed over thirty years ago. Indian Brook reservoir, from which the supply is derived, is located on a small tributary of the Croton River, near its mouth, and about 2.5 miles north of the center of the village. The reservoir has a storage capacity of 94 million gallons and a drainage area of 1.33 square miles.

Before the new plant was built, water flowed by gravity from the reservoir, through a 16-inch supply line, a distance of about one-half mile to the pumping station, now abandoned, where it was chlorinated and pumped to distribution by means of motor-driven centrifugal pumps. A

GENERAL VIEW OF NEW FILTRATION AND AERATION PLANT
In foreground, new raw-water settling basin with spray; back of this, new filter house and covered coagulating basin; left of the filter house, existing brick gate house; new filtered-water basin up on the side of the hill in left background



GENERAL ARRANGEMENT OF THE NEW FILTRATION, AERATION AND PUMPING UNIT AT OSSINING, N. Y.

low-service distributing reservoir of 12 million gallons capacity is located on the system to equalize the head.

Design of the New Plant

Local complaints of the chlorinated but unfiltered water related chiefly to its color and to disagreeable tastes and odors caused at times by algae growths in a low swampy area directly above the reservoir and in the reservoir itself. The turbidity, organic matter and iron content of the water were high. It was also soft and aggressive, the hydrogen ion concentration ranging from 6.0 to 6.5. The sanitary quality after chlorination was satisfactory.

Three methods of correcting the defects were considered:

1. Gravity rapid sand filters with preliminary settling and coagulation, double aeration and chlorination, all at Indian Brook dam.

2. Aeration and preliminary settling at Indian Brook dam, with horizontal pressure filters and chlorination at Croton Bay pumping station.

3. Coagulation at Indian Brook dam, with horizontal pressure filters and ozonation at Croton Bay pumping station.

After consideration of construction and operating costs and of the results obtainable by each of the above methods, it was concluded that the best interests of the village would be served by building a modern gravity rapid sand filter plant as outlined under method 1.

The new filtration, aeration and pumping plant has a capacity of two million gallons per day. It consists of a raw-water settling basin with aerator, a coagulating basin, a combined filtered-water and wash-water basin with aerator, and a filter house containing four rapid sand filters, chemical dry feed machines, chlorination equipment for chlorinating the raw and filtered water, and new low-lift pumps, as well as the old high-lift pumps transferred from the Croton Bay station.

Special Problems

In addition to the necessity for treatment which would render the water palatable as well as healthful, there were related problems which influenced the design. One already mentioned was that presented by the seepage occurring through Indian Brook dam. This leakage was conserved by locating the new filtration plant so that the concrete walls of the coagulating basin and the substructure of the filter building intercept and impound it. A low concrete dam at the northerly end of the coagulating basin and a short wall at the southerly end of the plant extend the cut-off entirely across the deep portion of the valley. The pool thus formed between the new plant and the old earthen impounding dam is utilized as a preliminary settling basin.

A second problem was that presented by the character of the excavation at the site of the new filter plant and the desirability of limiting the amount of deep excavation adjacent to the existing dam. The only location available for a filtered-water basin, in which the effluent of the filters could be received by gravity, was under the filters and pipe gallery. Such an arrangement would have been unduly expensive, for difficult excavation would have been

required for the basin and it would have been necessary to lay more than 1,000 feet of 16-inch pipe in deep trench, crossing under the Croton aqueduct, to carry the filtered water to the existing supply line at a point lower in elevation than the bottom of the basin. All of this costly work was obviated by locating the filtered-water basin on the side hill and pumping the effluent of the filters to it by means of low-lift pumps.

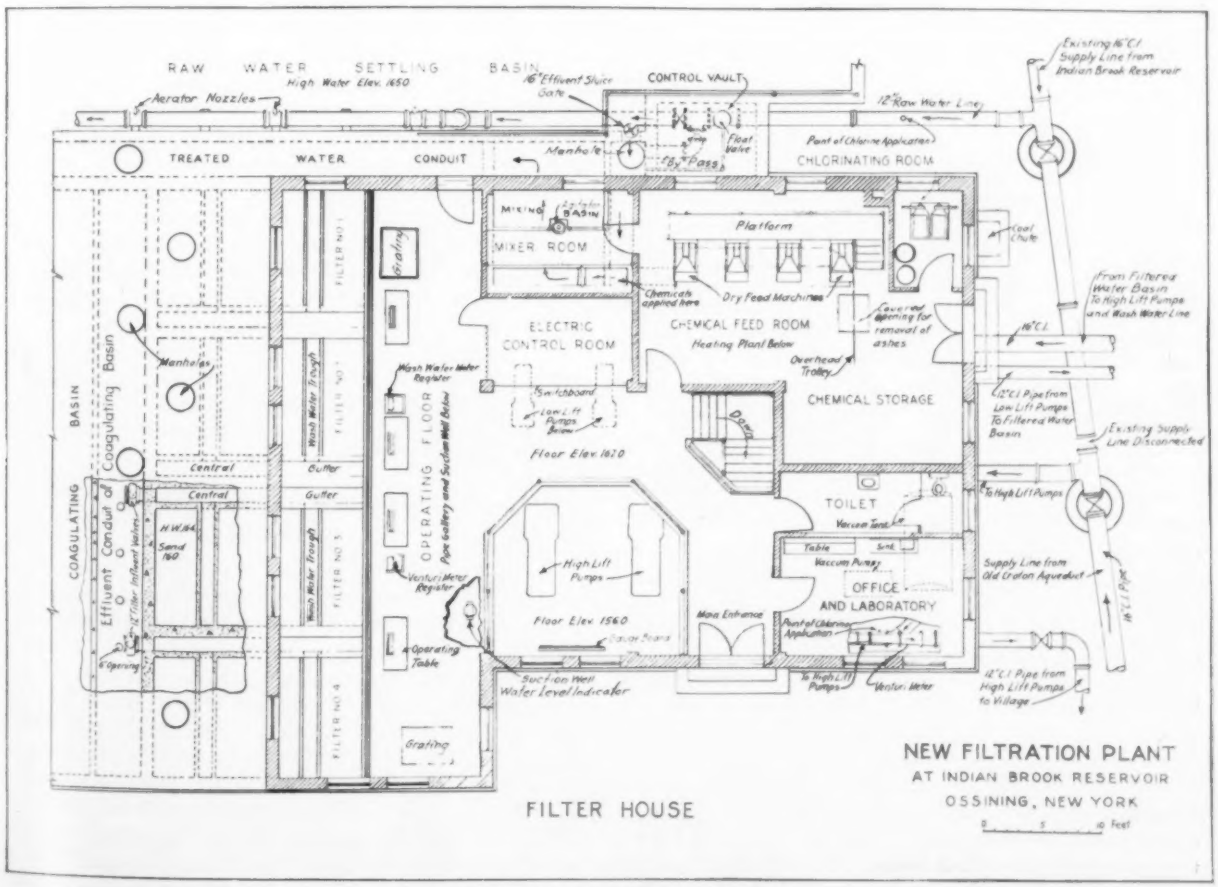
A small concrete well located under the filter house receives the effluent from the filters and serves as a suction well for the pumps. The filtered-water basin is set at an elevation suitable for supplying by gravity the water required for washing the filters so as to eliminate the necessity for a wash-water tank and wash-water pumps. The head gained by elevating the filtered-water basin was conserved, because the effluent flows under pressure to the suction side of the high-lift pumps.

A third problem resulted from the distance between the existing pumping station and the new filtration plant. It was the extra operating expense and inconvenience which this separation would have entailed that led finally to the removal of the pumping equipment from the Croton Bay station to the new filtration plant and the abandonment of the old station. The pumping equipment removed consists of two DeLaval horizontal centrifugal pumps, each having a capacity of 2 million gallons per day, driven by General Electric synchronous motors, one of 125 and the other of 150 hp., discharging into a new 12-inch cast iron line 2,400 feet long, laid to the existing force main near the Croton Bay station. It is estimated that this arrangement will effect a saving of $3,000 per year in operating costs and will simplify the pumping and filtration operations.

The fourth problem, an issue of the preceding one, involved the method of conveying water from the Old Croton aqueduct to the high-lift pumps in their new location. The invert of the aqueduct is about 6 feet lower than the floor of the filter house on which the foundations of the pumps are placed. A solution of the problem was found by installing a vacuum pump and tank in the filter house to keep the pumps primed when they are taking water from the aqueduct, and by using a portion of the old supply line to convey water from the aqueduct to the pumps.

The New Filtration Plant

The water as it leaves Indian Brook reservoir is chlorinated, after which it enters the raw-water settling basin through spray nozzles. It leaves this basin and passes into a small mixing chamber in the filter house, where it is dosed with chemicals for coagulation. Thence it flows in a concrete conduit along the side of the coagulating basin next to the sprays and enters this basin at the end farthest from the filter house. After passing through the coagulating basin and through the four filters in the filter house, it is pumped by low-lift pumps to the filtered-water basin, which is located among trees on the side of the hill, being aerated a second time as it enters this basin. From the filtered-water basin it flows to the high-lift pumps in the filter house and is chlorinated again before being pumped to the village.



FLOOR PLAN OF THE FILTER HOUSE

The Raw-Water Line

A 12-inch cast iron raw-water line for conveying water from the impounding reservoir to the raw-water settling basin was cut into the old 16-inch supply line just below the brick gate house. Chlorine for prechlorination is applied near this connection. A Golden-Anderson float valve on the raw-water line shuts off the supply when the settling basin is full. Eight Spraco nozzles, spaced 12 feet apart on the raw-water line spray the water into the basin under a head which varies with the elevation of the water in the reservoir, the maximum head being 27 feet. The old supply pipe was broken below the new raw-water line to prevent by-passing the filtration plant. A branch of the raw-water line makes it possible to by-pass the settling basin if desired.

The Raw-Water Settling Basin

The raw-water settling basin is irregular in shape, with a maximum depth of 10 feet and a total capacity of 300,000 gallons. High water is fixed by the crest of a new concrete overflow dam, 30 feet long by 10 feet high, at one end of the basin. The sloping sides are paved with 6 inches of concrete, with a low concrete wall along the top of the slope. Except for an existing channel for draining the reservoir, which is paved with stone blocks, the bottom is of earth. Some leakage through the old earthen dam enters the basin through drains along the easterly side; some percolates into it through the bottom; and some, seeping into the lower part of the spillway channel of the dam, flows into the basin at its northerly end.

The Coagulating Basin

The coagulating basin has but one compartment, because the size of the distributing reservoir in the village makes it possible to shut down the filtration plant for several days. It is 80 feet long by 50 feet wide, has a water depth of 11.5 feet, and provides a detention period of four hours when the flow is 2 million gallons per day.

The work of cleaning is greatly reduced by the provisions for drainage. Most of the settling particles are stopped by a central baffle and accumulate in the inlet half of the basin, which can be cleaned without dewatering. The inlet half is underdrained with 6-inch vitrified tile lines, spaced 3 feet center to center, provided with 6 x 4-inch tees with the branch hubs set flush with the surface of the concrete floor and fitted with vitrified plugs having a 1-inch hole in the center. Most of the sludge can be removed to a drainage chamber through these drains without unwatering. The outlet half of the basin is not underdrained but slopes towards the drainage chamber. This is connected to the 16-inch drain pipe from the filters, which discharges into the brook below the plant.

Filter House

The filter house is a substantial brick building with cast stone trim. It has a flat concrete roof covered with Barrett Specification AA four-ply roofing. The building has all modern conveniences, such as electric light, steam heat and plumbing. The main entrance leads directly into the filter room, which contains the operating tables and switchboard. Also on the ground floor are a chemical feed room with space for chemical storage, a chlorinating room, a mixer room over the mixing basin, an office and laboratory, an electrical control room and a toilet.

The building extends over nearly one-half of the filters so that the condition of the water in them can be observed from the operating floor. An opening in the floor serves as a sight well which permits observation of the pumps in the basement. In the reinforced concrete substructure, or basement, are the filters, pipe gallery and suction well under the pipe gallery; a pump room containing the low-lift pumps and vacuum pump and tank, with appurtenances and piping; and a mixing basin, heater-room and coal-bin.

The Chemical Feed Equipment

The chemical feed equipment consists of electrically driven, manually controlled Savage-Gauntt dry feed machines. Four units are provided, for flexibility of operation, so that there may be one each for alum, soda-ash, lime and activated carbon. As four machines will not be required at the same time, this number also provides a spare for use in emergency. Each machine has a solution mixing box which drops the chemical solution into a channel that discharges it into the water coming from the raw-water settling basin at the inlet end of the mixing basin. Provision is also made for feeding soda-ash or lime into the suction well under the pipe gallery.

The Mixing Basin and Filter Units

The mixing basin is 11.5 feet long by 8.25 feet wide, with a 9-foot depth of water. Thorough mixing of the solution and water is accomplished by means of a motor-driven agitator in the center of the basin. The agitator consists of a bronze propeller blade revolving on a vertical shaft in a rectangular metal box having open ends. It induces a vertical down-center circulation through the box, the water impinging on the bottom of the basin and flowing upwards at the walls and out at the end opposite the inlet.

Each of the four filter units is 17 feet 9 inches long by 10 feet wide and has a capacity of 510,000 gallons per day when operating at a rate of 125 million gallons daily per acre. The sand is 30 inches deep, with an effective size between 0.35- and 0.45-mm. and a uniformity coefficient of less than 1.65. Beneath the sand is 18 inches of gravel graded from 1/8-inch material at the top to 2-inch at the bottom. The strainer system consists of 6-inch half-round cast iron pipes spaced 12 inches center to center and set 0.5-inch off the floor of the filter tank. In the top of the pipes are 0.5-inch holes spaced 6 inches center to center. The wash-water troughs are of concrete with the crest 27 inches above the top of the sand. The filters are designed for a rate of wash of 15 gallons per minute per square foot.

The Operating Tables, Controllers and Meters

Tables made by the Norwood Engineering Co. are used to operate the filters. Each is equipped for the control of the hydraulically operated gates and with gages indicating the rate of flow and loss of head. Builders Iron Foundry rate controllers maintain a uniform flow through the filters, the effluent going into the suction well under the pipe gallery. They are governed by a master float control which closes when the suction well becomes full, and opens as the water level drops. The output of the plant is measured by a Builders Iron Foundry venturi meter in the discharge line of the high-lift pumps. The indicator, register and recorder are near the operating tables. The quantity and rate of water used for washing are measured by an electric

flow meter in the 12-inch wash-water line, with an indicator and register near the tables.

The Suction Well

The suction well beneath the pipe gallery is 50 feet long by 9 feet wide, with a total capacity corresponding to a detention period of fifteen minutes with a rate of two million gallons daily. A float-operated gage indicates the elevation of the water surface in the suction well, and an electric alarm rings when the water rises above or falls below predetermined points.

The Electric and Pumping Equipment

The Westchester Lighting Co. supplies 4,150-volt, 3-phase, 60-cycle current to the plant. The current as supplied operates the high-lift pumps. A transformer outside the filter house reduces the voltage to 220 volts for the low-lift pumps and smaller power units and to 110 volts for lighting. A Westinghouse six-panel switchboard controls the operation of the motor-driven equipment. A separate small meter panel and a lighting panel board are mounted on the wall near the switchboard.

The low-lift pumping equipment consists of two Allis-Chalmers 6 x 6-inch, Type SF centrifugal pumps, each driven by a 30-hp. squirrel-cage motor. The rated capacity of each pump is 2.1 million gallons daily against a head of 57 feet. The high-lift pumps, which were moved from the old Croton Bay pumping station, have been described. The control arrangements are such that the pumping units will ordinarily be started or stopped by means of knife switches at the switchboard, but include push-button switches at the pumps for stopping the pumps in an emergency. The unit for priming the low-lift pumps and for drawing water from the Croton aqueduct when necessary, consists of a motor-driven Nash Hytor vacuum pump, size No. 1, and a vacuum tank 4 feet in diameter by 8 feet long. Gages to indicate the suction lifts and discharge pressures at which the pumping units are operating are mounted on a gage board on the wall of the filter building, where they can be seen from either floor. The gage connected to the suction of the high-life pumps also indicates the elevation of water in the filtered-water basin.

The Chlorine Equipment

The equipment in the chlorine room consists of two Wallace & Tiernan MSPM type solution feed chlorinators, so that the water can receive both pre- and post-chlorination. A Fairbanks-Morse 500-pound scale is provided for each chlorinator. A ventilator in the wall of the chlorine room near the floor provides a vent, should leakage of chlorine gas occur.

The Filtered-Water Basin

On the roof of the filtered-water basin is an aerator consisting of fourteen Spraco nozzles through which the water from the low-lift pumps can be sprayed. The basin is 55 feet long by 25 feet wide, with a 10-foot depth of water. Its capacity is 100,000 gallons, corresponding to a detention period of 1.2 hours with a rate of 2 million gallons per day. The basin has a two-fold function: (1) to equalize demands upon the filters; and (2) to supply water for washing the filters. The gage in the filter house which indicates the elevation of water surface in the basin has an electric alarm, to ring at high and low points.

General Features

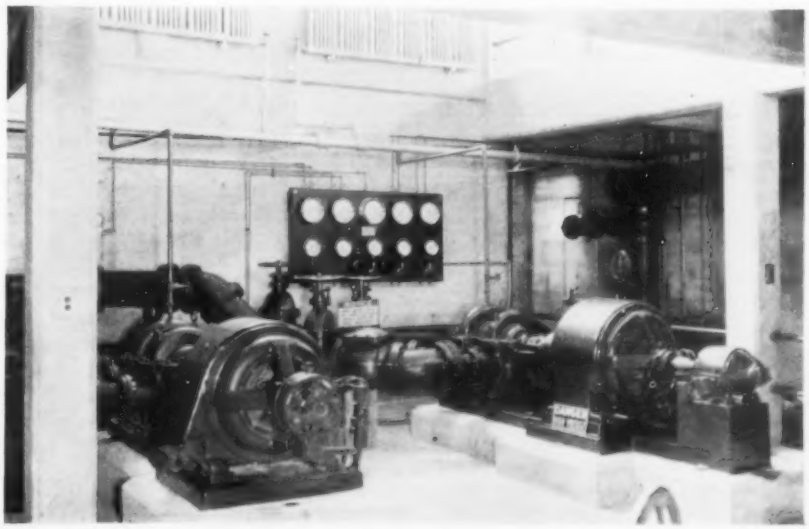
The office and laboratory in the pump building is equipped for chemical and physical tests necessary as part of the routine operation of the filter plant.

The entire plant is arranged with a view to compactness and convenience of operation, so that it can be run with a minimum amount of attention. Nearly all the operations for filtering and pumping can be carried on within the filter house, thus reducing materially the number of steps that the operator has to take. From a position in front of the switchboard he can view the gages on the operating tables, the meter registers on the operating floor, the gage board over the high-lift pumps, the water-level indicator of the suction well, and much of the pump-room floor below. A few steps take him to any of the operating tables, to the chemical feed machines or to the stairway leading to the pump room.

Provision for handling chemicals and getting them into the dry feed machines makes this operation an easy one. Space for storage of chemicals is close to the door at which they will be unloaded from trucks and is also near the machines. An overhead trolley with hand-operated hoist is provided for raising the chemicals to the top of the hoppers. A raised platform at the rear gives the attendant full control of this operation.

The contract cost of constructing the filtration and aeration plant, including removal of the pumps from the Croton Bay pumping station and laying the new 12-inch cast iron discharge line of the high-lift pumps was $115,000.

The plant was designed and the construction supervised by Nicholas S. Hill, Jr., consulting engineer, New York, who also exercises general supervision of its operation. The operation is under the immediate direction of James Bedell, Superintendent of Water Works at Ossining. The contractor was the Columbia Contracting Co., of New York.



PUMP ROOM OF FILTER HOUSE

In foreground, high-lift pumps moved from old pumping station; gage board for low-lift, high-lift and vacuum pumps on wall; pipe gallery at right in background; suction well level indicator behind motor at right

Low Costs of Construction More Than Offset High Interest Rates

By **E. B. MYOTT**

Fay, Spofford & Thorndike
Consulting Engineers,
Boston, Mass.

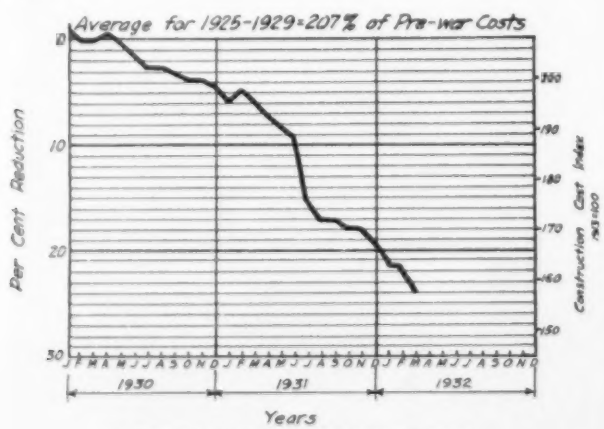
CONSTRUCTION costs in general are lower now than they have been since 1916. It has been customary since the World War to consider construction costs in relation to those which prevailed just previous to the war. There was a large variation in costs following the war, but beginning in 1925 they became more stable. During the period 1925-1929 the variation in costs was very slight; the costs averaging about 207 per cent of those which prevailed previous to the war.

There has been a general decline in costs since 1929, and at the present time they are only 157 per cent of pre-war costs, or about 25 per cent lower than the average costs during 1925-1929. This decline is shown graphically on the diagram.*

The present conditions indicate that construction costs may continue to decline somewhat for at least several months. The recovery of general business will tend to stabilize prices of material, but there will be a greater reduction in labor rates, as a result of municipal and legislative action now pending. It is safe to assume, however, that prices in general will increase following the recovery of business.

There has not been a more opportune time during the last two decades for municipalities to make needed improvements. There are many municipalities where improvements are needed which should take advantage of the prevailing low prices. It is now possible to build a project at a cost of 10 per cent less than costs which may prevail after general business recovers. Such a saving on a $200,000 project, for example, would be $20,000. If a municipality were considering an appropriation of $20,000, the appropriation would generally be the subject of a commission or committee investigation and it would be very carefully considered. Why then should not equally careful consideration be given to the present possibility of saving the same sum of money? Present conditions offer a twofold opportunity, which should not be neglected; an opportunity to realize on comparatively low costs and at the same time an opportunity to materially improve general business conditions.

* The Construction Cost Index Numbers, as published by *Engineering News-Record*, have been used as a basis for this diagram. These index numbers are a national index of general construction costs in the United States.



THE FALL IN CONSTRUCTION COSTS
This graph shows the reduction below the average costs of 1925-1929

High Cost of Bonds vs. Low Cost of Construction

A large amount of construction work has been postponed recently on account of the higher rates of interest demanded for loans to finance their construction. It has been necessary for the banks in order to meet anticipated demands to keep their assets in a very liquid state. As a result, cities and towns which in the past have been able to secure loans at reasonable rates of interest have suddenly found their credit questioned by the banks. Many cities and towns have been unable to get loans under any conditions either for construction or for operation. It has been necessary, therefore, for many municipalities to reduce their operating costs to an absolute minimum. The results expected from the Reconstruction Finance Corporation and the Glass-Steagall amendment to the Federal Reserve Act will restore credit and confidence, enabling municipalities and others to resume activity; beneficial effects of these measures have already been felt.

The construction of public works should not be indiscriminately postponed at this time; advantage should be taken of prevailing low construction costs, even though interest rates for loans are higher. Municipalities should proceed at the earliest possible moment with engineering investigations and designs for their needed improvements. Several months are usually required for engineering work. At the end of this period construction costs may be greater, and without doubt it will be possible to borrow money at lower rates of interest.

The additional cost of a bond issue at the prevailing higher rates of interest is not great when compared with the difference between present cost of construction and cost of construction which may be expected following the recovery of general business. It is safe to assume from past experience that immediately following the recovery of business the cost of construction will increase at least 10 per cent.

Many municipal projects in New England are financed by the sale of 20- to 30-year serial bonds. The difference in the total cost between 4 and 5 per cent interest is only 7.4 per cent for 20-year serial bonds, and only 9.6 per cent for 30-year serial bonds. If construction is undertaken at the earliest possible moment, it will be possible to realize a saving in construction cost greater than the additional cost of a 1 per cent increase in interest for loans to finance the work.

Jamestown Enlarges Its Municipal Power Enterprise

THE JAMESTOWN, N. Y., MUNICIPAL ELECTRIC PLANT

By **LOUIS T. KLAUDER**

Consulting Engineer, Philadelphia, Pa.

EXTENDING back into the early 90's and the period during which much doubt existed as to the wisdom of municipal ownership, the Board of Water and Lighting Commissioners of the city of Jamestown, N. Y., was created, and authorized by popular vote to sell bonds in the small sum of $30,000 to establish a municipal lighting plant for the sole purpose of street lighting. Somewhat later a similar amount was authorized in order to equip the plant for the generation and distribution of electric current to private consumers. This was not accomplished, however, without the usual opposition to all public projects, particularly when, as in this case, a comprehensive franchise had previously been accorded to a private company.

The investment inaugurated in 1892 has since grown to approximately $3,000,000, at times with the assistance of minor bond issues, the interest charges of which were naturally paid from revenue; but the expansion was primarily from earnings used for capital expenditure.

Equipment Modernized

The original equipment, consisting of cumbersome, inefficient, belted generators, was continued in operation with various minor modifications until 1920, when a comprehensive plan and program were developed not only for the immediate requirements, but what was then supposed would be the maximum need over a long period of time. The plan provided for an ultimate installation of four 5,000-kilowatt turbine generators, and a boiler house capable of housing eight steam generating units. The initial step of this program was again financed by the sale of bonds of approximately $250,000 and included the construction of a new boiler house and the installation of two boilers, coal- and ash-handling equipment, and a 2,000-kw. turbine in the existing engine room. The installation of but one high-pressure turbine unit and limited boiler equipment made necessary the constant ability to operate, in an emergency, the original low-pressure boilers and generating equipment, involving a constant stand-by fuel loss. The realization of this handicap to plant efficiency, the continued increase in demand and the encouragement of a constant improvement in earnings prompted the Board, as then constituted, to install the first generating unit of the general plan, namely, a turbine of 5,000-kw. capacity.

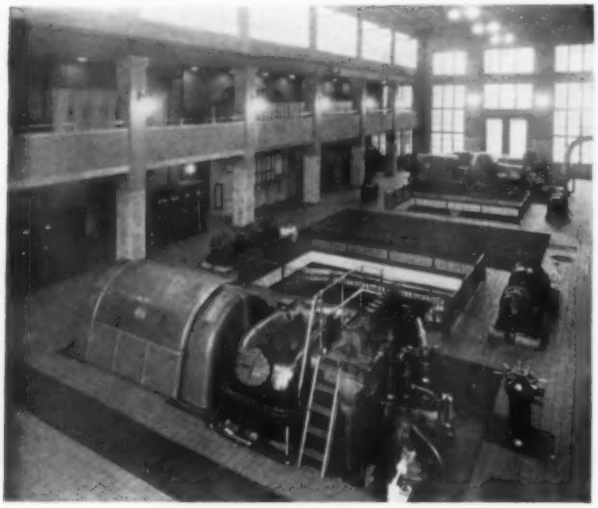
It was soon evident to the city, however, that even larger generating units would be necessary to meet power demands greater than had originally been anticipated, and with the further development of higher operating steam pressures and the probable increase in economy, additional boilers and a 12,500-kw. generating unit were authorized.

Unified System Promotes Economy

The Jamestown metropolitan area includes a population of some 50,000 people. Until recently it was served by both the city plant and the Niagara, Lockport & Ontario Power Co., successors to the original competitor. This company obtained power over high-voltage lines from Niagara Falls. As a result of the recent purchase of the competing system, the city plant is now in a position to serve the entire 60-cycle power requirements of the district, and frequently does so; and because of this increased output, the economy of the plant has been greatly increased. In accordance with the system purchase contract, however, all 25-cycle power for street-railway and other direct-current conversion is being obtained, for a five-year period, from the Niagara company.

The city generating plant, planned with a comprehensive view to the continued increase in the sale of electric power, is equipped with the most modern of labor-saving devices and with steam and power units of high efficiency. Coal is delivered to a siding adjacent to the plant, and ash is similarly removed, all without manual labor other than that required in the control of operations. Overhead coal- and ash-storage facilities take care of the accumulations necessary between deliveries of coal and subsequent removals of ash.

The water required for boiler feed purposes, while largely provided by the condensation processes, requires, as is usual in such plants, a nominal amount of make-up, which is taken from the adjacent water supply, clarified



THE TURBINE ROOM
In the foreground is the 12,500-kw., 13,200-v. G.E. turbo-generator

and corrected in order to eliminate, in large part, scale-forming and corrosive characteristics. Water for oil, air and other cooling purposes is clarified and, so far as make-up requirements justify, because of its heat content, is subsequently treated by the zeolite process and recirculated through the boiler feed cycle.

The boilers, or more specifically, steam generators, consist of those with suspended and ventilated side walls, water-cooled bridge walls, economizers, superheaters, and automatic multiple-retort underfeed stokers capable of operating boiler equipment at high overloads. Air for combustion is taken from the upper section of the boiler house down through the setting and delivered preheated to the stoker.

Expansion Provided for

Steam is delivered to turbine generating units having a total capacity of 25,000 kw., facilities having been provided in the recent extension of the plant for the installation of an additional or second 12,500-kw. unit, which will result in a total installed capacity of 37,500 kw. The turbines are equipped with surface-type condensers provided with water from the Chadakoin River, the outlet of Lake Chautauqua, approximately 75,000 gallons of water per minute circulating through the condensers at the maximum capacity of the plant.

Power is delivered over a modern underground transmission system, at 13,200 volts, to a series of commercial and street-railway sub-stations and stepped-down at these centers to a primary distribution voltage of 4,600; railway power is converted to 600 volts d.c. All new stations, and eventually all stations, will be fully automatic, operated by a supervisory control system from the central or generating station. Direct-current power, available only in the central or business section of the city, is converted from alternating current by 25-cycle rotary converters. These, because of the early contemplated change of frequency, are now being superseded by 60-cycle equipment. The entire discontinuance of direct current, however, is anticipated in the not distant future, through an arrangement whereby the city provides new a.c. equipment required in customers' plants, primarily for printing and elevator service, the justification of the city's expenditure being based on the elimination of a second system of generation or conversion, and distribution.

High-Grade Administration

The outstanding success of Jamestown's municipal utility venture is due primarily to two simple and yet frequently overlooked factors:

First, the Board of Commissioners, as appointed by Mayor Samuel A. Carlson, now serving the city for his tenth term of office, consists of men eminently successful in private life and free from political influence, the Board being entirely independent of control by the Board of Aldermen.

The second factor consists of the broad vision and comprehensive planning, on the part of men so qualified and selected, which has permitted the consistent expansion and constant modernization of the local power and lighting facilities. The Board has never hesitated to abandon an obsolete installation or method. Arc lights were early visioned as such, and direct current, as already mentioned is now in a like manner being rapidly discarded.

Notwithstanding the fact that Jamestown is credited with the lowest lighting rates in New York State, the first 50 kwh. being at the maximum rate of 3½c per kwh., the surplus has increased from $137,000 in 1912 to more than $2,000,000 in 1930. The plant has paid all expenses and its entire bonded debt out of revenues, without any assessments against the taxpayers. The recent operation of larger generating units, justified in part by the acquisition of the competing company, has reduced the coal consumption per kwh. some 26 per cent. Thus, while in 1930 coal per kwh. was 1.94 pounds, in November, 1931, it was actually 1.44 pounds, with a further 10 per cent reduction anticipated following the completion of present boiler equipment additions.

The city pumping station has been electrified at a cost materially less than would have been necessary in the replacement of one of the larger steam pumping units previously in service. Pumping is largely confined to the night period in order to maintain a more uniform load on the generating station and also to permit the Water Division to benefit by the low off-peak power rate, which is in general 25 per cent less than the normal charges.

Improvements Not a Burden to Taxpayers

The city is now engaged in placing all transmission lines in underground conduit, and plans are being developed to permit the elimination of all overhead primary distribution wires. Because of the local control of all power facilities, improvements of this character have been very greatly encouraged, since, as previously suggested, all such improvements, being made from earnings, place no additional burden on the taxpayer. Were the rates comparable to those charged until recently by the competing company in districts beyond municipal competition, there would be sufficient profit to entirely eliminate all taxes for city and local school purposes. Quoting the present mayor in a recent address: "The people save an amount, as a result of present low rates through municipal ownership, equivalent to the local taxes paid."

Because of the strategic location of the plant in relation to the business center, and in order to utilize to maximum advantage the boilers of lower pressure than those re-

cently installed, the Board of Commissioners has under advisement the installation of a district heating system. Such a service would require no additional capital expenditure in heating plant, or plant labor. The distribution system could readily be maintained by the present Water Department organization and effectively administered by the present Business Department with but minor labor or clerical additions.

The summation of the situation in Jamestown indicates the following reasons for its outstanding success: (a) business administration; (b) policy of building largely for earnings; (c) low administrative overhead; (d) well-developed load capacity; (e) low rates for service; (f) comprehensive planning.

In conclusion it should be stated that while the entire project was developed and designed in the office of the writer, as engineering consultant for the Board of Public Utilities, the construction has been under the personal supervision of Karl Peterson, Chairman, and Melvin O. Swanson, Superintendent, the chief executive and administrative officers of the Board, and the final project is in no small measure due to the continued interest and enthusiasm of these officials, although all members of the Board have given unstintingly of their time and ability.

Hand Labor vs. Machinery in Emergency Relief Work

To the Editor of THE AMERICAN CITY:

Referring to the article, "Working the Unemployed without Proper Tools is Wasteful and Shortsighted," appearing in the December, 1931, issue of THE AMERICAN CITY, I beg to disagree in part, if not in general, with the writer's argument. While I will agree that it is a waste of effort putting a lot of men to grubbing out stumps by hand, I do believe there are many jobs of work needed in the average municipality that can be done wholly by hand labor at slightly added expense and should be done by the municipality to make work now.

I would not attempt to argue for or against paternalistic government, or the possible right or wrong of the unemployed looking to government for employment, but the fact remains that we are confronted with a serious crisis, and extreme measures must be resorted to in order to relieve the situation. Any thinking man must admit that industry in general is not in a position to help the situation to any appreciable extent, nor can private or community charity care for the vast number begging for the right to earn enough to keep body and soul together.

The results we have accomplished in our community lead me to express myself so vigorously in opposition to your article, which I feel, though true in part, might have the effect of discouraging the undertaking of projects by those municipalities that have not the money available for large tool equipment, yet might be able to finance work using hand labor.

Wyoming is exclusively a residential village, of approximately 3,800 population, lying just outside the city of Cincinnati, and all employed residents are dependent on the Cincinnati industrial area. The Cincinnati and Hamilton County Community Chest is a very efficient and well-organized agency, having grown from a war development. Its total budget last year was $2,000,000, of which the village of Wyoming contributed $30,000. Last winter the Chest established an agency here in our Municipal Building to function in this community and surrounding territory.

In the winter of 1930-31 we attempted to care for the unemployed in connection with the Chest agency by extra street cleaning, park improvements, and the inevitable woodpile. We soon found that we were not getting value received for the money we were spending.

As we had drawn up a new sewer plan some six years ago, which had lain in abeyance owing to our inability to finance the $300,000 project, our thoughts last fall naturally turned to sewers, since this has been our crying need for so long.

With $8,000 obtainable from the budget without a higher tax rate and an additional $1,600 advanced by the Community Chest, we undertook to lay a 200-foot section of 48-inch sewer at an average depth of 16 feet, all with hand labor, and have been able in this way to give two days' work per week to a group of men, beginning with 24 and increasing to 45 at Christmas time, which have been carried since. Our entire tool equipment consists of picks and shovels, four 1-inch Manila ropes for lowering pipe, trench jacks, and two truck loads of trench planking.

The cost of the job has been slightly above the engineer's estimate of six years ago, probably 30 or 35 per cent above the present contract price. As the Community Chest has absorbed 16 2/3 per cent of the cost, the actual increased cost of this sewer to the village is only some 20 per cent more than would have been the case if let by contract, and the Community Chest and the citizens would have been called upon for much greater amounts of help had these 40-odd families not had the advantage of the $8,000 payroll coming to them through the winter, enabling them to get the necessities of life by working for them and not from charity.

F. G. GEDGE,
Service Director, Village of Wyoming, Ohio.

London Invites You to the International Congress of Local Authorities

ALL public officials who are interested in local government in the United States are cordially invited to join the American delegation which is going to London for the Fifth International Congress of Local Authorities. The Congress convenes on May 23, 1932, and closes its London sessions on May 28.

The Conference this year is devoted to two major topics: first, the practical working of local authorities; and, second, the training and recruitment of local government officers. In addition to the program there will be numerous excursions under official auspices in and about London, as well as more extended trips to other places.

The official receptions planned by the National Government at Lancaster House, by the London County Council at the County Hall, by the Lord Mayor at the Guild Hall, by the London School of Economics and Institute of Public Administration at the London School, as well as the receptions planned by individual cities throughout England, make this Conference unusual. Various members of the American delegation are planning special trips both in England and on the Continent following the Conference.

The American delegation is planning to sail together from New York on May 13, both for the sake of sociability and to secure the most economical transportation. Arrangements should be made through Luther Gulick, 302 East 35th Street, New York City.

This Conference offers an unrivaled opportunity for making contacts with British and Continental public officials who are interested in the improvement of local government and in the exchange of experiences and ideas.

Pot-Holes Not Wanted

By **S. W. HODGIN**
City Civil Engineer,
Richmond, Ind.

BREAKING UP AND CRUSHING THE ORIGINAL PAVEMENT ON THE NATIONAL ROAD AT RICHMOND, IND.

RICHMOND, Ind., is a city of 33,000 population, with about 88 miles of streets, including asphalt 5 miles, brick 7 miles, concrete 16 miles, bituminous macadam 5 miles, waterbound macadam 20 miles, gravel 22 miles, unimproved 13 miles. With the exception of the very heavy traffic on the state highway routes, into and from the city, of which there are nine, the traffic on the improved streets is uniformly divided and moderately heavy.

Prior to 1891 practically all the usable streets of the city were of untreated gravel. Beginning with that year, a street improvement program was started, which has been carried out faithfully ever since, until at the present time 85 per cent of all streets are paved with some form of permanent surface.

Pavement by Petition

Richmond's practice in the first construction of so-called permanently improved streets, that is, those of brick, concrete, sheet asphalt or similar hard surface, with few exceptions has been similar to that in many other cities. The improvement is petitioned for by interested property owners and the regular legal proceedings instituted. The cost of such improvements is now assessed against the abutting property, in accordance with the Indiana Barrett Law. Richmond, being a third-class city, is permitted to assess all of the improvement against the affected property, or the city, as a whole, may assume a part of the cost. In some cases the city has paid for the intersections. The decision as to the city's assuming any of the expense lies with the Board of Public Works and is influenced by the importance of the street to be improved and the value of the property benefited. At least three types of pavement are advertised, and the type selected is left to the choice of the affected property owners.

Rebuilding Gravel Roads

Several years ago many worn-out gravel roadways were rebuilt. In each case the surface of the roadway was scarified to a depth of about 3 inches, and 5 inches of new bank-run gravel was added. This was thoroughly harrowed, shaped, wet and rolled to the desired crown and smoothness. With the final rolling, the surface was brushed by means of a steel brush attached to the roller, thus filling the voids in the larger aggregate and giving the surface a smooth finish. Before further treatment was given, the roadway was permitted, when possible, to stay open to traffic until the succeeding year, in order that it might be thoroughly compacted.

After this thorough compaction under traffic, all depressions were filled with patch material, the proper contour of roadway was re-established and the surface again swept clean. Following this, the roadway was treated with cold Tarvia B by means of a pressure distributor. For the first treatment about ½-gallon per square yard was applied and after a short time for setting, the street was thrown open to traffic. After the entire roadway had become well rolled down by traffic, a second application of about ¼-gallon of Tarvia B was made. In most cases a covering with a moderate amount of chips or pea gravel was added after the second application.

Streets constructed in this manner have been in use many years under moderate traffic and have given the utmost satisfaction. The first cost of this type of reconstruction was about 40 cents per square yard. The maintenance cost is very light.

Maintenance Problems

Prior to 1912, our macadam streets were maintained as originally constructed, either by the addition of gravel or by scarifying and re-rolling the macadam. They would become, of course, very dusty and require frequent sprinkling in the summer time. To overcome this nuisance, the practice of treating the roadway with road oil was started. This work was first done by the petition of the residents of any particular street and was paid for by subscriptions from the petitioners. Such treatment acted only as a dust palliative and frequently resulted in the street's getting into worse condition than had nothing been used. The oil seemed to destroy the actual bonding quality of the gravel, and in wet weather formed an objectionable greasy mud.

About 1917 the city began to surface-treat the gravel and waterbound macadam streets with higher grade bituminous materials. The streets first treated were those that had been built and used for many years and had therefore become well compacted, so that it was not necessary to build a base.

Maintenance Becomes Reconstruction

The first treatment, similar to the construction described above, was, and still is, to shape the untreated roadway to proper contour, filling all holes with patch material, cleaning the surface of dust and applying, with pressure distributor, a penetrating bitumen in sufficient amount to form a moderate depth of coated material. Usually from ¼- to ½-gallon per square yard was used for this binder. On this surface, after blading or dragging, stone chips or pebbles are spread, using about 10 pounds per square yard. After a short time, the street is thrown open to traffic. In other cases it is found desirable to blade or drag

The Maintenance and Reconstruction Methods Used in Richmond, Ind.

the roadway again and give the surface a second treatment with a lesser amount of bitumen.

Maintenance by Re-treatment

After a gravel or macadam street has been treated in this manner, it must be surface-treated periodically as conditions may require. The period of re-treatment varies from two to five years, depending upon the condition of the original base and the traffic handled. For this resurfacing the general practice is to thoroughly clean the paved surface and apply about 10 pounds of stone chips or pea gravel per square yard. On this is applied, from a pressure distributor, 0.15- to 0.25-gallon, per square yard, of bituminous material, heated to 200 to 300 degrees. In some cases the stone chips are spread after the application of bituminous material. The latter method has some advantages, in that traffic may be admitted within a short period without the surface's being picked up. The first method appears to give a better coating of the chips.

This type of maintenance treatment costs from 4 to 6 cents per square yard, or about 1½ cents per yard per year.

Frequent Treatments More Economical

A majority of our streets are so treated and are always in practically as good condition as the paved streets. Treating the roadway more frequently with a minimum amount of bitumen seems to keep the street in better condition at all times than heavier applications at less frequent intervals. By following this practice no trouble has been experienced with surface corrugations.

Resurfacing an Old Rough Pavement

A portion of Main Street, a distance of about 6,000 feet, was paved with brick in 1892 and 1893. This street is a part of State Highway No. 40. Standard Canton paving blocks were used and laid on an 8-inch stone base, the pavement extending over a double-track electric railway. The original pavement cost was assessed against the abutting property, the city paying for the intersections. The brick surface had served its life and had become rough, owing to broken and sunken bricks, and was very expensive to maintain. A life of 38 years for this type of pavement indicated excellent initial workmanship and firm foundation. On account of the rough surface it was deemed necessary to improve it.

After much consideration, it was decided this year that the existing pavement should be retained, patching it where loose, and covering the entire surface with 1¼ inches of surfacing material. The original program called for ¾-inch of hot asphalt plant-mix, made by a local contractor, to be covered with ½-inch of rock asphalt.

The plant-mix consisted of asphalt-coated No. 6 stone chips or crushed gravel, dried and heated to a temperature of about 350°. Trinidad Lake asphalt was heated to about 300° and was mixed with the aggregate and a small amount of limestone dust filler in a pug-mixer. The hot-mix was hauled to the job from the plant in trucks covered with tarpaulin to conserve the heat.

SPREADING AND ROLLING THE HOT-MIX RETREAD ON THE NATIONAL ROAD AT RICHMOND, IN 1931

Results Were Popular

The pavement was thoroughly cleaned and painted with a coat of emulsified asphalt. ¾-inch of the plant-mix was then spread, at a temperature of about 200°, raked to proper contour and thoroughly rolled. On this the ½-inch of rock asphalt was spread and again rolled with a 7½-ton roller.

This was done for about one-fourth the entire length of the street needing improvement and was all that could be so done with available funds and without materially curtailing other street work. The work proved so satisfactory to the public generally that there was a demand that the entire improvement be completed in 1931. Funds for the entire improvement, with the rock asphalt top, could not be raised. However, the plant-mix was applied for the entire stretch, and the street was thrown open to traffic as soon as the rolling was completed. One of the advantages of using plant-mix material is that no portion of the street need be out of service more than a few hours.

This improvement, which cost 62 cents per square yard for the single course of hot-mix, and 92 cents per square yard for the combined hot-mix and rock asphalt, has been in service for ten months and is very satisfactory. Along the street-car rail, where the surface material was feathered out to a thin layer, it is chipping off in a few places. This, however, was expected, and these spots, as well as others which we expect to develop, will be patched with rock asphalt as needed.

Concrete Also Resurfaced

In 1916 a concrete pavement was built in Richmond under the Three-Mile Road Law. It is now part of our street system. For the previous three or four years this pavement had been distintegrating badly, each winter adding to its destruction. In order to save it from further disintegration, it was decided to cover the concrete with a bituminous top, the work to be done jointly by Wayne

A CLOSE-UP OF A HOT-MIX RESURFACING JOB IN RICHMOND, IND., LAID IN 1931, USING CRUSHED LIMESTONE

County and city employees.

First, a 4-inch layer of No. 2 stone was spread, shaped and rolled to proper contour and compacted to about 3 inches. This course was laid to a width of 20 feet, though the concrete was but 18. After rolling, the stone was penetrated with 1¾ gallons of tar Tm per square yard, chipped with No. 6 stone and dragged until the voids were well filled. Further surfacing was done by the addition of more chips and cut-back asphalt, until a total of about 2½ gallons of bituminous material per square yard had been applied.

In order to close or seal the surface voids, a final application of 10 pounds per square yard of rock asphalt was made and well rolled. This final treatment was very effective and produced a fairly smooth surface.

This pavement, part of which is now a State Highway Route, has been in service, under fairly heavy traffic, for over a year and gives every evidence of standing up. The cost was 93 cents per square yard.

Fighting a Skid

About ten years ago the Indiana State Highway Department rebuilt a portion of Route No. 40, the National Road, east of the city, by the penetration method, applying from 8 to 12 inches of stone. The road was built to a crown of 15 inches, in a width of 46 feet between curbs, with a single track of a traction line in the center. An excessive amount of asphalt was used, which resulted in bleeding and caused a very slippery surface in wet weather. This surface condition, with the excessive crown and traction line rails, presented a very dangerous situation. Many accidents occurred due to cars' skidding. This stretch of road was taken into the city in 1929, the city thus falling heir to the problem of correcting the dangerous condition.

Frequent applications of stone chips were made to the pavement, in an attempt to establish a surface that was not slick. The chips were effective for a short time, but on account of the excessive amount of bituminous material, the stone was forced down and the surface again became very slick. This treatment also increased the already excessive crown.

Had there not been standard concrete curbs and gutters along this road, it would have been possible to build a top on the existing pavement and thus secure a non-skid surface. The surface was scarified to cut down the thickness of the penetrated stone course by about 3 inches. Then a new surface that would not get slippery in wet weather was built. A "rooter" was used to break up the penetrated stone base. As the work was done in cold weather, the asphalt binder was brittle and crumbled readily. The 3-inch excess of stone was hauled away and applied to other roadways where it could be used to advantage in building base. After being cut down to grade, the remaining coated stone was shaped to proper contour and rolled with a 10-ton roller until thoroughly compacted. The surface was then coated with one gallon per square yard of emulsified asphalt. On this was applied a one-inch course of the plant hot-mix asphalt made by the local contractor. After thoroughly rolling and sanding the surface, this pavement was at once thrown open to traffic. This surface is as non-skid as it is possible to make it and seems to have corrected the dangerous condition.

The cost of the work was about 82 cents per square yard and in the aggregate will amount to about $14,000. Payment is being made from the city's General Fund by special appropriation.

Save the Base and You Save Money

In general, in resurfacing any of our pavements we have attempted to do the work without destroying the old base. A base that has been compacted by years of use is as good as any that can be built new and certainly should not be disturbed without good cause. With the exception of new construction work, which is always done by contract, all of our street repair work is done by the city's Street Department.

ACKNOWLEDGMENT.—From a paper presented at the Eighteenth Annual Road School at Purdue University.

Over 9,000 Reports on Contractors

THE Bureau of Contract Information, Inc., 727 Fifteenth Street, N.W., Washington, D. C., organized a little over two years ago has been successful in rendering over 9,000 individual reports on contracting concerns throughout the United States. This is a remarkable record in the interest of awarding contracts to responsible organizations. The services of the Bureau of Contract Information, Inc., are available to those who award construction contracts, namely, architects, engineers and public officials, and without charge, but are sent in exchange for information received from them on contracts awarded as well as performance of contracts and notices of defaults and failures in the performance of contracts.

The Bureau has recently issued its Directory of Contractors for 1932 listing those organizations which have filed their performance records with the Bureau. This Directory is available to those responsible for the award of construction contracts who desire to use the services of the Bureau, which is a non-profit-making institution, whose disclosure of information is without recommendation, favor or prejudice.

Every City Needs as Much Play Space as It Can Afford

By CHARLES HERRICK

THERE has been a great deal of discussion of desirable minimum standards for parks and playgrounds, and much difference of opinion, mainly because some of the important factors of the problem have been overlooked. Park standards have been expressed in two ways: one acre of park for every 100 people; or 10 per cent of the area of the city. For an average density of 10 persons per acre, these two expressions are equal, but let us assume two extreme but not impossible conditions. First, a city with an average density of 80 persons per acre would have to devote 80 per cent of its area to parks to comply with the first standard, while if a city with an average density of 2 persons per acre were to assign 10 per cent of its area to parks, it would have one acre of park for every 20 persons. With an average density of population of 30 persons per acre, 10 per cent of the area of the city would have to be used for park purposes to provide one acre of parks for each 300 people. Every city needs as much play space as it can afford. With the probable increase of leisure time, more people will have an opportunity to play, and a more generous provision of play space probably will be common in the future.

Meeting Two Objections

At the present time, there are two main objections to the acquisition of additional park or recreation areas, namely: the cost of the parks increases public expenditures, which are already too high; and when land is purchased from private owners, for public use, it is removed from the tax duplicate. To those who have not studied the problem carefully, it seems self-evident that the tax rate must be raised. There is a limit to the tax rate which people will stand, as recent "tax-strikes" in several cities prove. There is a serious problem here which should be studied.

Most city planners believe that parks increase the values of the remaining property to such an extent that the taxes on values created by the parks are more than sufficient to pay for their acquisition and development, without increasing the tax rate. A few examples are cited in city planning literature to prove this, but practical taxpayers can often find instances where there is no apparent increase in values near a park, and where expenditures of public money for parks have been followed by heavy tax burdens.

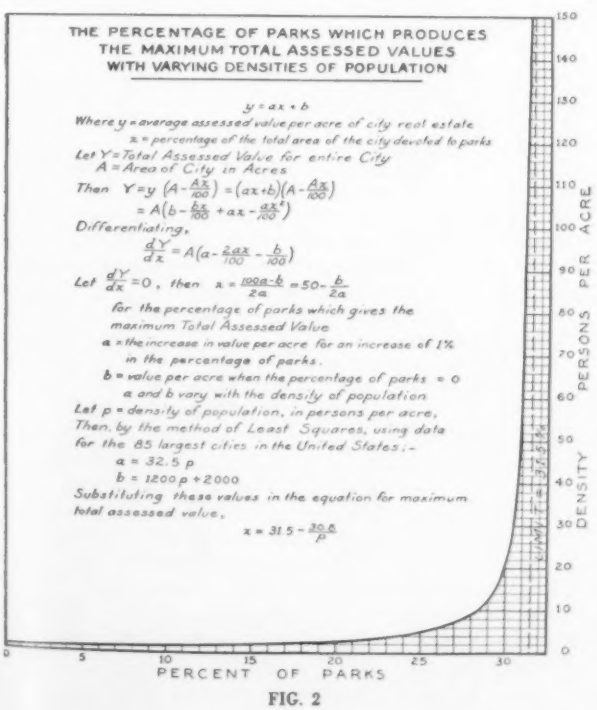

THE PERCENTAGE OF PARKS WHICH PRODUCES THE MAXIMUM TOTAL ASSESSED VALUES WITH VARYING DENSITIES OF POPULATION
y = ax + b
Where y = average assessed value per acre of city real estate
x = percentage of the total area of the city devoted to parks
Let Y = Total Assessed Value for entire City
A = Area of City in Acres
Then Y = y (A - Ax/100) = (ax+b)(A - Ax/100)
= A(b - bx/100 + ax - ax²/100)
Differentiating,
dY/dx = A(a - 2ax/100 - b/100)
Let dY/dx = 0, then x = (100a - b)/2a = 50 - b/2a
for the percentage of parks which gives the maximum Total Assessed Value
a = the increase in value per acre for an increase of 1% in the percentage of parks.
b = value per acre when the percentage of parks = 0
a and b vary with the density of population
Let p = density of population, in persons per acre.
Then, by the method of Least Squares, using data for the 85 largest cities in the United States:-
a = 32.5 p
b = 1200 p + 2000
Substituting these values in the equation for maximum total assessed value,
x = 31.5 - 30.6/p
PERSONS PER ACRE
DENSITY
PERCENT OF PARKS
0
5
10
15
20
25
30
150
140
130
120
110
100
90
80
70
60
50
40
30
20
10
0

FIG. 2

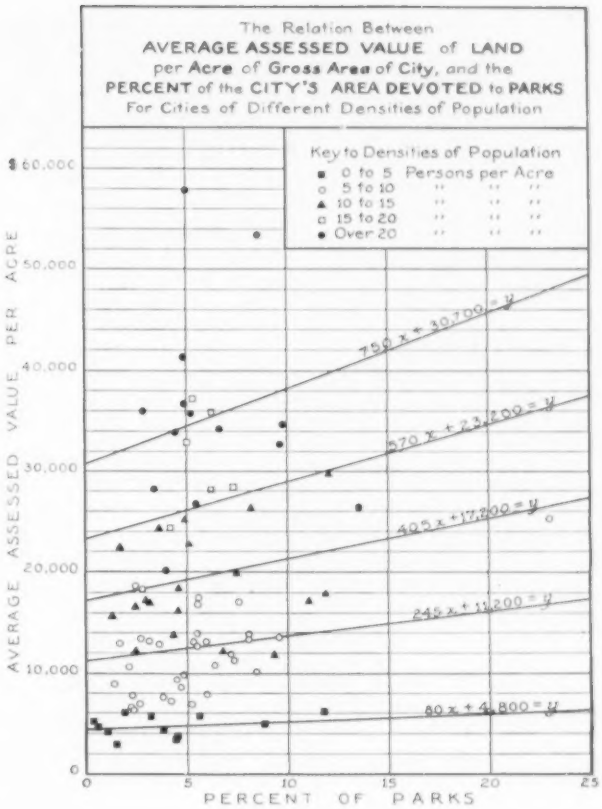


FIG. 1

Effect of Parks on Assessed Values

Three years ago the writer began reducing the available data to mathematical terms. "Assessed Value of Real Estate" with the "Basis of Assessment" are given in the annual "Financial Statistics of Cities" published by the U. S. Census Bureau, and the areas of parks and playgrounds were found in Bulletin 462 of the U. S. Bureau of Labor Statistics. The assessed values were converted to "true values" by using the percentages given, and the average value of real estate per acre was computed from the data in the Census reports. The "real estate value" given in these reports includes the values of both land and buildings. The park acreages were reduced to percentage of the area of the city. This information was found for 85 cities of over 100,000 population. When the data were first plotted, there appeared to be no relation between average values and percentage of parks; but when the cities were divided into groups according to density of popu-

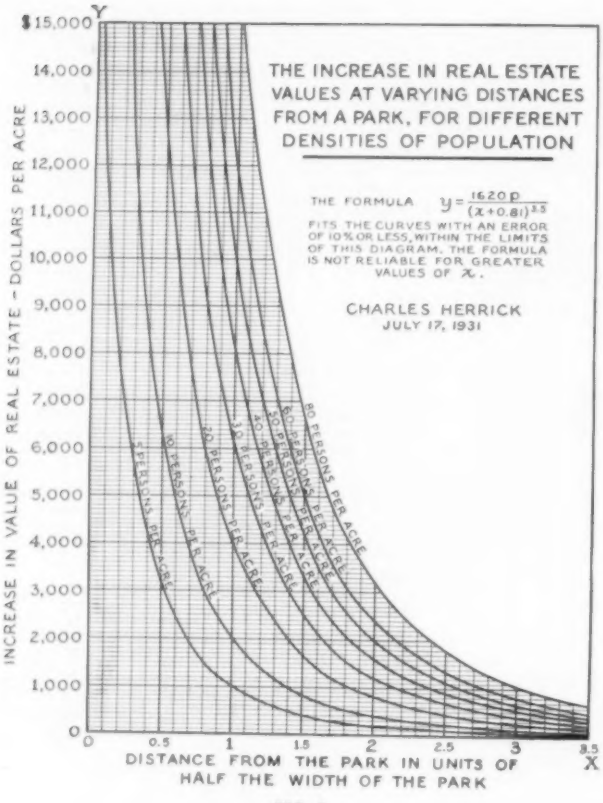


FIG. 3

lation, it became apparent that there was a relation between the two, as shown graphically in Figure 1. By a complicated mathematical process known as "least squares," the data were reduced to the simple formula:

$$y = 32.5\ px + 1200\ p + 2000$$

where y = average value per acre of real estate;
p = density of population, in persons per acre;
x = percentage of the city's area in parks.

By means of this formula, a rough idea can be secured of the probable increase in assessed values which any given park will produce. In each case, an investigation should be made to see how the formula fits local conditions. Where, at first, there appeared to be large discrepancies, these have been found to be due to state or county parks within the city limits, but not included in the published records, to parks reported as city parks which were outside the city limits, or to unusually large industrial or undeveloped areas within the city. In cases where the formula was apparently in error by 80 per cent or more, corrections for factors mentioned above have reduced the error to less than 10 per cent. In general, the formula is correct to within 30 per cent, or within the range of estimated property values as given by different "experts." The important fact is that the formula separates the effect of density of population from the effect produced by parks, and also eliminates the effects of numerous factors which enter into the values of individual parcels. Without such separation or elimination of other factors, no mathematical expression could be obtained for the relation between parks and property values.

This formula shows that, as the density of population increases, the effects of parks upon property values increases, and a larger percentage of parks can be afforded. The amount of park space which can be afforded in any particular city depends upon the amount which must be paid for the land.

Seeking a "Park Standard"

An attempt to derive a "park standard" is shown in Figure 2, which gives the derivation of a formula for the percentage of parks which produces the maximum total assessed Values with Varying Densities of Population. The formula is:

$$x = 31.5 - \frac{30.8}{p}$$

and from the curve this percentage can be determined for any density of population. If a new city were being constructed on undeveloped land, and a definite limit could be placed on the density of population, this formula would give the limiting percentage of the land which could be devoted to parks. If an economic development is the aim, this limit should not be exceeded, but this purely economic limit could be more liberal than any of the standards so far proposed. Assume a Garden City standard of 6 families, or 25 to 30 persons per acre in the residential areas, equal to an average density over the entire town of about 12 to 15 persons per acre. This formula shows that 29 per cent of the area of the town might profitably be devoted to parks. Allowing for the possible error in the formula, still 20 per cent of the area might be used for parks, which with this density of population would be equal to one acre of parks for every 75 inhabitants of the town.

Effect of Varying Distances

In existing cities each park proposal should be tested, to see whether it will pay for itself, or be a burden to the taxpayers. Each proposal will be an individual problem in itself, as railroad or industrial property will usually not be increased in value by a park, and residence districts of different densities or character will be affected in different ways, and parks of different shapes will have different effects. From the original formula, another one was derived, giving the increase in value per acre of real estate at varying distances from a park. This formula is:

$$y = \frac{1620\ p}{(x + 0.81)^{3.5}}$$

Where y = increase in value per acre of real estate;
p = density of population in persons per acre;
x = distance from the park to the center of the area in question, the unit being half the width of the park. Expressing the distance in this way makes it possible to use the formula for parks of any size or shape.

The curves in Figure 3 give these increases for all practical values, and the formula is not reliable beyond the limits of this diagram. This formula and the diagram are a reliable guide for the judgment in estimating the increased values which any particular park may cause. The existing and probable future use, densities of population, and character of development, should be taken into consideration. Park designers in the past have hazarded the opinion that waterfront parks are twice as valuable as inland parks. This formula shows that Carl Schurz Park, on the East River in New York City, produces as much effect on property values as a park almost three times its actual width, or that the "effective width" of Carl Schurz Park might be measured to the middle of the river.

Parks are often proposed by interested property owners who wish to dispose of their real estate, and cities usually have to pay "full value" even in times when there is no market for real estate at any price. These formulas might help to demonstrate that some park projects would involve the city in increased tax burdens, but they would help city planners to prove that parks in correct locations will increase property values and decrease tax rates. Where land values are not exorbitant, they might show that more and larger parks are possible.

What Is Sewage Disposal?

Written for Non-Technical Officials Briefly and in Plain Language

By HENRY W. TAYLOR
Consulting Engineer, New York

THERE in much popular confusion as to sewage disposal, its purposes, problems and methods. The full story is a long one, and to present much detail would serve to increase the initial confusion. The following brief statement presents a skeleton picture of the subject in plain language, and with the necessary cutting of corners required by brevity. The purpose of this statement is to rectify misconceptions and to establish a point of beginning from which one may advance to any desired degree of detail.

Confusing Terms

The terms commonly applied to sewage works are unfortunate and misleading to the average non-technical official. A "sewage disposal plant" is not a sewage disposal plant. It is merely a sewage treatment plant. Sewage is principally water and is ultimately "disposed of" in a natural body of water. There is no hypnotic disappearance perpetrated in a sewage plant. It merely serves to remove or modify the more harmful characteristics of sewage so that when the sewage is discharged into a body of water, the natural purification processes of this water will not be overtaxed. "Sewage purification plant" is an equally confusing and erroneous term. It has taken on the idea of complete purification, whereas that is seldom if ever obtained. A sewage plant includes one or more of the steps looking toward purification and does not complete the process of producing pure water, as the term might be assumed to imply.

What Is Sewage?

Sewage is 99.99 per cent water plus a small quantity of other matter. However, this extremely small portion of other matter pollutes the whole mass, causes all the trouble and is removed with extreme difficulty. From a mechanical point of view, part of this polluting matter floats on the surface of the water, some of the coarser material will settle out rapidly, the fine matter settles out with difficulty, and some will not settle out at all. From the chemical angle some of the foreign matter is mineral, and most of it is organic and subject to decay. From a biological point of view, sewage contains numerous types of bacteria. One major class of these bacteria thrive where there is no oxygen, and another main class require oxygen to carry on their work. A third classification may be termed disease bacteria. The bacteria that work without oxygen produce foul odors in the process of reducing organic matter to a stable state. The bacteria that work in the presence of oxygen oxidize organic matter, without nuisance, so that it is not subject to decay.

When sewage is discharged directly into a stream, the sewage discolors the water of the stream. The matter that will settle readily makes deposits along the bed of the stream while the floating matter displeases the eye and collects at the shore line. The matter subject to decay draws upon the oxygen in the water, and if the stream can supply a sufficient quantity of this oxygen, the decaying material is oxidized, with the aid of one class of bacteria, into a stable state. Any stream has only so much oxygen available for this purpose, however, and if the polluting matter in the sewage demands more oxygen than the stream can supply, the stream becomes progressively affected until it approaches the condition of the sewage, and the other class of bacteria assist to produce foul gases and odors. The disease bacteria threaten water supplies and the water at bathing beaches and shellfish beds.

In order to avoid such conditions, a sewage plant attempts to remove the major part of the floating matter, to settle out the material that would otherwise form deposits on the bed of the stream, and to remove such a quantity of foreign matter as would otherwise demand too much of the oxygen in the stream. The plant also indirectly removes a given percentage of the disease bacteria, or attempts to kill them by artificial means. It may go so far as to remove the major quantity of color and render the sewage practically inoffensive prior to dilution in a natural body of water. In other words, sewage treatment does not obviate ultimate disposal of the main volume of sewage in a watercourse, but it aims to so change the sewage that natural processes of purification will not be overworked and thus rendered ineffective. It at once becomes apparent that the degree of treatment is that required by the capacity of any given body of water to continue and complete the treatment started by the sewage plant. This consideration forms the basis of decision as to the requirements for treatment in any given case.

Problems of Sewage Treatment

The foregoing brief statement summarizes the major purposes of sewage treatment, and these purposes give rise to a series of definite problems which must be met. The sewage works must remove the major part of the floating matter and retain the necessary proportion of such matter as would otherwise form sludge banks and deposits in the stream. The sewage works must also remove a sufficient amount of organic matter, both in solution and in the solid state, so that the demand upon the stream for oxygen to continue the oxidation process is not in excess of the stream's ability to supply this oxygen. The treatment plant must also remove a certain percentage of the disease bacteria, depending upon the proximity to sources of water supply, etc., and in some cases it is necessary that the plant materially reduce the color of the sewage, which would otherwise be noticeable in the natural stream.

Methods of Treatment

There are several accepted methods by which an attempt is made to solve these problems. Brevity requires a very limited statement of these methods and also in-

volves the omission of all methods except those which are generally accepted in present practice.

The most elementary method of disposing of sewage is to discharge it without treatment directly into a stream whose dry-weather flows are many times the volume of the sewage. Increasing population and the increased use of sewer systems are rendering this disposal by mere dilution more impracticable, year by year. It throws the whole burden upon the natural processes unaided by treatment works.

Screens

The simple expedient of screening the sewage removes garbage and floating matter, but little of such fine material as may putrefy later. Somewhere between one-tenth and one-twentieth of the organic matter which is subject to decay is removed. This simple method of treatment obviously requires discharge of the sewage into a relatively large volume of water.

Settling Tanks

Settling tanks are used in most sewage works. The settlement of sewage removes generally more than half of the polluting matter not in solution. It removes more than three-quarters of such solid matter as will settle out at all. From another angle, it removes about a third of the matter which is subject to decay, and about one-half of the total number of bacteria. It tends to reduce the demand of the sewage for oxygen by about one-third.

Settling tanks are usually built of concrete and the untreated sewage is delivered to one end of the tank, flows slowly through it, depositing in the tank the settling solids, while the rest of the sewage overflows at the outlet end of the tank and is either carried on to other steps in the treatment process or delivered to a natural watercourse or body of water for ultimate disposal. A multitude of different forms, shapes and depth of tanks are used, but they all have the characteristic of an inlet and an overflow and a bottom arranged for the removal of settled solids without draining the tank for such purpose. It has been found that there is an economic limit to the size of these tanks and they generally hold about two or three hours of flow of the sewage. It will be seen, however, from the above brief discussion of the settling tank that the results obtained from its use are of considerable importance, and the cost of the simple concrete structure involved is easily warranted by these results.

The material deposited in these settling tanks is called "sludge," and it must be removed from the tanks and disposed of by the sewage works. Sludge may be disposed of without treatment other than burial, or it may be digested in tanks, where it is acted upon by harmless bacteria and converted into liquid, gas and inert humus. The latter is generally disposed of by draining and drying on sand beds and is then used for filling purposes or for fertilizer. Undigested sludge is usually offensive, will not drain on a sand bed, and must be buried, or lagooned in an isolated place. Digested sludge drains readily and is inoffensive.

Sludge Digestion Tanks

Sludge tanks are generally built of concrete and are cylindrical. Present practice is tending toward equipping these tanks with covers which serve to keep the floating sludge submerged, permit of drawing off digested sludge without admitting outside air, and also serve to collect the gas which is formed in the process of decomposition. This gas is often used in gas-fired heaters serving a simple hot water heating system installed in the digestion tank. When the temperature of the sludge is raised to about 82 degrees Fahrenheit, the process of decomposition is accelerated. The digested sludge from the bottom of the tank is periodically drawn off to sand filter beds, where some of the water drains off from the sludge, some of it evaporates, and the former liquid mass drains and dries to an inoffensive humus, which is then removed from the beds and may be used as a fertilizer.

Treatment of Liquids in Sewage

Following settlement, a multitude of different steps in the treatment of the liquid portion of sewage may be included in the sewage works. After the liquid sewage leaves the settling tanks, the most important thing to accomplish is to supply oxygen to it by some artificial method so as to reduce the oxygen requirements of the sewage when it is discharged into a stream.

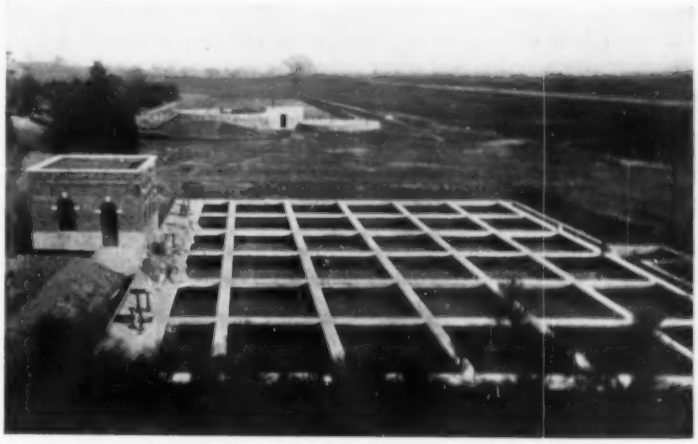
Sprinkling Filter

One of the most frequent methods used to supply oxygen or oxidize the sewage overflowing from a settling tank is a filter of stone called a sprinkling filter. The sewage from a settling tank is intermittently sprayed on the top of this bed area and trickles down through the stones to the bottom of the filter. By sprinkling the sewage upon

A SIMPLE SEWAGE TREATMENT WORKS AT SARANAC LAKE, N. Y.

From right to left: Office building and sludge pump house, settling tank, sludge digestion tanks with control house between, sludge drying beds, dried sludge storage platform and depressed roadway for trucks hauling sludge away for fertilizer

the filter bed, sewer gases are freed and atmospheric oxygen is absorbed before entering the filter. In the filter itself bacterial life develops on the surface of the stones, and these bacteria continue the oxidizing process. Between doses of sewage, the whole content of the filter is supplied with oxygen from the air by natural air circulation through it. It is apparent that oxygen thus supplied to the sewage by means of the air and through the activity of the oxidizing bacteria in the filter forestalls the demand for this oxygen from the stream into which the sewage is finally discharged. It has been found that the flow from this type of filter requires only one-fifth as much oxygen from the stream as would be required by an untreated sewage. Such a type of filter, when operating efficiently, removes the chance of nuisance when the sewage is discharged into a stream with a flow a few times larger than its own. This method of treatment also reduces the number of harmful bacteria in the sewage by about 90 per cent. Furthermore, the flow from such a filter has generally had a large percentage of its color removed.



THE PRELIMINARY TREATMENT PLANT AT ROME, N. Y., SHOWING SLUDGE DIGESTION TANK AND DRYING BEDS IN THE BACKGROUND

Sand Filter

A still greater improvement in the character of sewage can be obtained by the use of a sand filter. The settled sewage is discharged onto the surface of a sand bed and the sewage passes through the sand to the drains under the sand. After such a discharge of sewage, the sand filter is allowed to rest for a while, and during this rest period is drained off, partially dries out, and is supplied with fresh oxygen from the air. Bacterial activity in a sand filter corresponds somewhat to that already described in the case of the sprinkling filter, and this activity is necessary for successful operation. Such a filter may remove over 90 per cent of all matter subject to decay and prevents further decomposition. The sewage is rendered practically clear and the removal of harmful bacteria by the filter is 98 or 99 per cent. If a filter of this type operates successfully, large filter areas must be provided, and the cost of construction and maintenance are prohibitive in most cases. The real need for such a near approach to complete purification can seldom be established.

Chlorine Treatment

Another method of treatment which is used with success is the application of chlorine gas to the liquid flowing from the settling tanks. This method produces primarily biological results and removes better than 90 per cent of the bacteria in the sewage. It also produces some change in the organic matter so that less oxygen is demanded by the sewage from the body of water into which it is discharged. This chlorine treatment may of course be used to supplement any other one of the stages of sewage treatment.

Activated Sludge

A method of sewage treatment which is attracting a good deal of attention is the activated sludge method. This introduces oxygen into the sewage by blowing air through it or by mechanical agitation of the sewage. It also mixes treated sludge with the fresh sludge. After settlement, the sewage liquor resulting from this treatment shows a reduction of about 90 per cent in polluting matter not in solution, a 90 per cent reduction in the oxygen required of a stream, and better than 90 per cent in the reduction of disease bacteria. Owing to the size of the tanks required and the supply of air demanded for aerating the sewage, this method is expensive in construction and maintenance for the smaller plants, although it is well adapted to large plants, and is with refinements, subject to adaptation for smaller units. It involves cheaper construction than a sprinkling filter, but is much more expensive to operate, owing to the cost of supplying air by some mechanical means.

The sludge from this type of plant can be satisfactorily disposed of by means of sludge digestion tanks and sludge beds, which have already been described.

A Difficult Problem

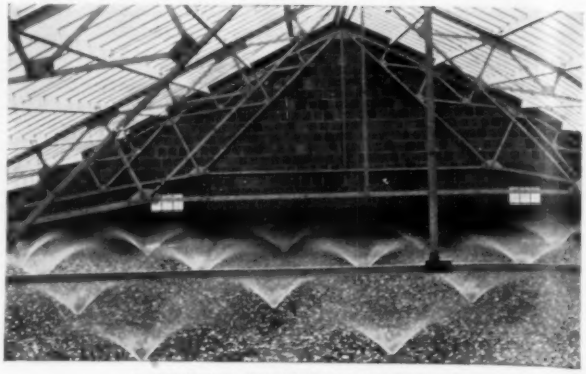
The foregoing brief outline of sewage treatment has been given in as simple a form as possible. It is, however, one of the most complex engineering problems. The sewage of any municipality has characteristics of its own requiring special attention. Sewage flow is not constant, and its characteristics change hourly and daily over a wide range. The effect of changing temperatures and the need for maintaining certain biological and chemical conditions introduce serious complications both in design and in maintenance. The flow of the stream into which the sewage is discharged is almost never constant, and consequently the facilities for final disposal of the sewage vary over a wide range. If storm water from the streets is admitted to the sewer system, large volumes of water must be accommodated carrying an entirely different class of polluting matter. New methods and new apparatus are rapidly developing. Financial considerations generally figure prominently in the study of the sewage problem.

Operation of Sewage Works

No discussion of the problems of sewage treatment would be complete without reference to the part that maintenance plays in the efficiency of any sewage works. It must never be forgotten that the construction of a sewage works at once involves a regular and intelligent maintenance of these works as soon as they are placed in operation. The regularity and intelligence of this attention for the smaller plants is fully as important as continuous at-

tendance. However, if a sewage works gets out of balance through lack of regular attention, restoring that balance is generally a trying and often expensive matter. Sewage works maintenance has in the past been slighted and it will take some time to develop a corps of plant superintendents and operators who have the experience and ability to meet the problems that are encountered in the operation of a sewage works. Various State Health Departments have initiated schools for the training and instruction of works operators and these, with the sewage works associations, are doing much to raise the standard of sewage plant operation.

It is essential, after the construction of a sewage works, that it be operated for at least a few months by the designing and constructing engineers. Such supervision of operation by these engineers insures the successful solution of the usual and any unusual problems inherent in the initial stages of operation, and will serve to train local operators in work which is entirely new to them. Monthly inspections of plants should be made by competent experts after the training period has elapsed.



A COVERED SPRINKLING FILTER AT HAMILTON, N. Y.

Two States Honor America's First President by Promoting Planning Interest

The Vermont "Specials"

IMMEDIATELY following the appearance of the February issue of THE AMERICAN CITY, in the opening article of which Congressman Bloom, Associate Director of the United States George Washington Bicentennial Commission, stressed city planning as an ideal tribute to the Father of His Country, James P. Taylor, Executive Secretary, Vermont State Chamber of Commerce, launched a whirlwind campaign, which is achieving interesting results. The objective of this campaign is "George Washington Specials" in as many towns and villages as possible. These "Specials" are town meetings called to vote on the adoption of planning and zoning, and are in each case preceded by intensive community study of the subject.

Coming as the climax of educational propaganda to this end which extended through last year, and dramatized as "the perfect tribute to a man of action—more appropriate than words or ceremonies," the move promises to become a profound influence throughout the state. On March 1, Newport, Springfield, and Brattleboro voted for planning and zoning, and Bennington enthusiastically adopted planning. On March 8, Barton unanimously adopted zoning. Randolph voted on March 22 to adopt zoning.

Waterbury, Brandon and Ludlow are arranging for "Specials"; Vergennes and Middleboro are considering plans. Interest is being stimulated from headquarters; newpaper and radio publicity are being widely used; communities are challenged to competition with each other; and "Eastside" and "Westside" are strong rallying points for action. The score on March 29 was 10-5 for "Eastside," with changes in each score expected daily. Up to 1931, Burlington, with its Planning Commission, was the only community in Vermont to have taken action under the state permissive legislation of 1921. St. Johnsbury was zoned by ordinance of February, 1931, under special charter provision; and the villages of Lyndonville, Manchester, Essex Junction and Richford had acted under the zoning law of 1931 prior to this phase of the campaign.

"We take Sol Bloom very seriously," said Mr. Taylor. "In Brattleboro, for instance, the Speakers' Bureau, with only two or three members, appeared before 27 organizations in advance of the town meeting, reaching not only Tom, Dick and Harry, but Sarah, Ann and Jane. They carried their message to the G.A.R. and the D.A.R. They carried it to the American Legion and to eight church societies; they carried it to the Daughters of Rebecca and the Daughters of Isabella; to the Parent-Teacher Association; to the Sons of Veterans; to military companies and Masons; to the Grange and Red Men. *What are other states doing?*"

The Massachusetts Planning Game

From a neighboring state, the Massachusetts George Washington Bicentennial Commission makes reply in its recently printed statement:

"It is our purpose to stimulate in the rising generation the spirit and vision of Washington. In cooperation with the Boston Society of Landscape Architects, we have devised a game plan to vitalize for young people under 18 years of age throughout the state the future planning responsibilities of their communities." The plan calls for preparation of sketch maps and stories recording the good points as well as the bad of conditions as they now exist in their neighborhoods, towns, or cities. Descriptions of hills, valleys, roadways, waterways, streams; population, valuation, debt, and tax rate; developed public and private areas, are among the details to be studied. A map of the city 100 years hence is to be submitted. The prize and awards or merit may be made to an individual, a class, club, or school group. The game plan, with full particulars, is 5 cents from Captain Percy R. Creed, Secretary, 50 Congress Street, Boston; special rates on quantities over 25.

Professor Henry V. Hubbard, President of the American Society of Landscape Architects and Chairman of the School of City Planning, Harvard University, believes that "an undertaking like that sponsored by the George Washington Bicentennial Commission Town Planning Committee, which asks the children of the community to cooperate actively in local application of the principles of town planning, if it can be made real to the children and productive of some concrete results which they can see, may readily be one of the greatest influences for sane and effective city planning in the next generation."

The Street-Railway Paving Problem

By R. H. SIMPSON

Chief Engineer,
Department of Public Works,
Columbus, Ohio

A BRICK PAVEMENT AFTER SIXTEEN YEARS' SERVICE IN COLUMBUS, OHIO
The track construction is grooved rails and steel ties on a concrete slab sub-base

ONE of the perplexing and complicated problems of the paving engineer is the laying of a paving surface in the area occupied by street-railway tracks in public thoroughfares. In many of the smaller communities the problem has solved itself by the removal of the tracks, the abandonment of street-railway service, and the substitution of bus lines and trackless trolleys. In the larger cities, however, we still have, and shall continue to have, street-railway service that requires tracks in many of our main thoroughfares, tracks which occupy from one-third to one-half the width of the paved roadway.

The location and construction of such tracks in city streets creates a weakness in the pavement that is difficult to overcome. The mere presence of the rails in the roadway causes vehicular traffic to be confined to fixed lanes, which increases the wear and adds considerably to the maintenance cost of the pavement outside the track area, over and above the cost on pavements with similar traffic where there are no car tracks. Then again, the vibration of the track structure itself, caused by street-car movement, not only affects the pavement in the track area, but is transmitted to the roadway pavement beyond.

It is evident, therefore, that for the convenience and safety of the public who use these thoroughfares, the most substantial and permanent type of track and pavement construction possible should be adopted, in order to reduce to a minimum the weakness caused by their presence in the street.

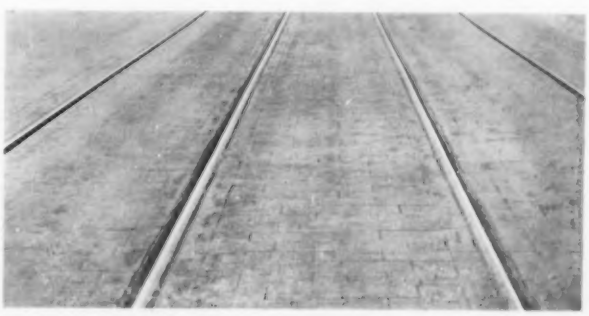
Track Construction

The sub-base for track construction should be well drained and unyielding. Very little attention was paid to the condition of the sub-surface in the earlier days of street-railway construction and it is remarkable how well many of the old tracks have withstood the traffic and the action of the elements. In those days the cars were light and the movement infrequent. With the coming of more frequent service and heavier equipment, it soon became apparent that a more substantial structure was necessary. Even now, however, many cities are still using a base of crushed stone, gravel or furnace slag, when such bases for city pavements are generally discarded. Why do we insist on a concrete base under our city pavements and still use a weaker type under the car tracks? It is admitted that, in some sections, bases of stone or slag may give satisfactory results. In many localities, however, the conditions are such as to require a more substantial structure under the track if a satisfactory pavement is to be secured.

In Columbus, Ohio

In Columbus, Ohio, the tracks constructed prior to 1912 were laid on a crushed stone base, the stone extending about half-way up on the wooden tie. A concrete pavement base 6 inches thick was laid around and over the upper half of the ties, on which was laid a surface of granite block, brick or asphalt. Our experience with this construction has proved unsatisfactory. In practically all cases the movements of the track eventually broke up the concrete, loosened the surfacing material and resulted in rough pavement requiring heavy maintenance. A very large proportion of this track, including the paving, has been reconstructed during the past fifteen years, as it was impractical to maintain a satisfactory pavement surface over the old track structure.

In Columbus, Ohio, the local street-railway company has used concrete under and around the ties and rails for 20 years. The earlier construction consisted of a concrete girder 12 inches deep and 18 inches wide under and around the ties and rail. This construction, while showing an improvement over the earlier design, was not entirely satisfactory and has been abandoned. Since 1914 the local company has used a concrete slab 8 inches thick as a sub-base for all track construction. This slab bridges over any weakness in the soil and prevents ground water from reaching the track structure and pavement base. The track consists of 122-pound 7-inch grooved rail bolted to 4-inch Carnegie steel ties and is laid on top of this concrete slab. It is then brought to proper grade, and held in position by blocks under the ties, leaving a space of about 2 inches between the top of the slab and the underside of the ties. After being brought to proper alignment, con-



AN ASPHALT BLOCK PAVEMENT ALONG STREET-RAILWAY TRACKS IN TOLEDO, OHIO

PAVING THE BASE SLAB FOR STREET-RAILWAY TRACK IN COLUMBUS, OHIO

Note the drain tile between slabs

crete is placed under and around the ties and up on the rail about 2 inches. This concrete, which holds the track firmly in position and acts as a base for the paving surface, rests on the sub-base slab, but is not bonded thereto. The track can therefore be readily removed and renewed without disturbing the sub-base slab. Granite block and brick have been used as surfacing material in car-track areas during the past twenty years.

The results obtained from the type of construction described above have been very satisfactory, and the long service, with practically no maintenance, shows that the cost of the installation is justified. From the standpoint of the city, it might be said that the pavement surface is exceptionally good after many years of service.

In Cleveland, Ohio

In Cleveland, Ohio, it was found that a type of construction somewhat similar to the earlier Columbus type, was hardly suitable for modern conditions, and recently about two miles of double track was constructed of a new design. In Cleveland an attempt was made to construct a base that would move with the track structure and would also support the pavement. In this work the track structure is supported upon a base made from coarse crushed blast furnace slag. A layer of fine slag is used for tamping under the wooden tie to bring the track to proper grade. The upper surface of the fine slag is carefully shaped to provide an extra depth of concrete under the rail. Six ½-inch steel rods are laid longitudinally in each track just above the ties. A special vibrating machine was used to settle the concrete around the rails and to give a dense mixture. The pavement surface consists of ½-inch slag cushion and 3-inch vitrified brick. This design called for a 7-inch grooved rail on wooden ties. The entire track structure and the paving surface moves, under street-car movement, as a unit. The results obtained from this construction, over a period of years, will be of interest.

Block-Type Surfacing

A number of types of surfacing are used for paving in car-track areas, such as asphalt, asphalt block, brick, concrete and stone block. Asphalt has been used with success on thoroughfares of ample width and where cross traffic is not excessive. It is low in first cost and easy to maintain. In narrow roadways, where traffic is heavy and moves in and out and across the tracks, it will be noticed that eventually an opening will form where the rail joins the pavement, due to rail movement and traffic. Water enters the opening and the edges of the pavement soon break up and disintegrate. This condition is aggravated where there is a pronounced movement of the rail. Notwithstanding this weakness, asphalt has been used extensively and with success in many localities.

Asphalt block is used with success as a pavement in the street-railway area of city streets. These blocks are very dense, and they hold their place even with some movement in the rail. The edges of these blocks, where they join the rail, seem to have enough strength to resist breaking down or raveling under traffic. They give a harder surface than sheet asphalt, but still have some of the flexibility and resilience of the latter.

Vitrified paving brick, on account of its reasonable cost and lasting qualities, are used very extensively in street-railway paving. They are not easily displaced, except where rail movement is excessive; and, on account of the edges of the brick being hard and firm, there is no tendency to break down under traffic, where they join the rail. Both cement grout and bituminous filler are used with success. Some railway engineers prefer the grout filler with brick pavements, as it gives some lateral stiffness to the rails. Bituminous filler lends itself more readily to the removal and replacement of the brick, when repairs to the track are required.

Granite and other stone block pavements are used extensively for paving in car-track areas. Granite, on account of its hardness and weight, holds its position along the rail in a very satisfactory manner. This type of pavement is so hard that there is very little tendency for cross traffic, or traffic following along the rail, to break down or wear the edges of the block. Blocks 4 inches in depth are commonly used, and both grout and asphalt as fillers. Where vehicular traffic is heavy, the stone block pavement is perhaps more stable, and it has a longer life than any other type, but of course the first cost is greater.

Concrete Between Tracks

During the past decade portland cement concrete paving in car tracks has been installed in many localities. Some engineers feel that the unit type of construction, in which the concrete is placed around the ties and rails and carried up to the surface as a unit, is the best type of construction. In theory the track and pavement is a unit and moves as a unit under street-car traffic. This construction is low in first cost, but it seems clear that the pavement surface will not last as long as the rail. When it is necessary to renew the pavement surface, it will be found difficult and expensive to do so without destroying the track structure.

Grooved Rail and Block Pavement

Municipal engineers, on whom falls the duty of constructing and maintaining smooth roadways on city streets, will prefer a grooved rail in street-car construction. They will, I believe, prefer a block type of pavement for surfacing in car track areas. With the grooved rail, the block can be placed against both sides of the steel and thereby produce and maintain a smooth surface for traffic. Then again, the block can be readily removed and replaced whenever repairs to track or pavement are necessary.

ACKNOWLEDGEMENT.—From the report of the Committee on Design and Construction, City Officials' Division, American Road Builders' Association.

PANORAMIC VIEW OF THE ABILENE, KANS., SEWAGE TREATMENT PLANT

Shifting River and Sand Foundation Create an Unusual Sewer Problem

By F. M. VEATCH

Assoc. M. Am. Soc. C. E.

Black & Veatch, Consulting Engineers,

Kansas City, Mo.

THE Smoky Hill River played an abominable trick upon the city of Abilene, Kans., in the spring of 1926. For many years this river had carried away the sewage of the 6,000 residents of the city, but during one night it changed its course, leaving the city sewer outfall two miles inland on the banks of a dry river bed. This created a serious state of affairs, for the inland lagoon became a gigantic septic tank.

The next year an attempt was made to build a pumping station near the old outfall with a discharge line to the new river channel. This project was not a success, for the builders failed to heed the injunction of Holy Writ against building on sand. After considerable delay followed by a careful study of the problem, the city decided to treat the sewage at a point approximately one mile above the outlet of the old outfall line in order to prevent nuisance in the old river bed between the sewer outfall and the new river channel. This plant was placed in operation in June, 1931, and has been successful in abating the nuisance in the neighborhood of the outlet.

The Treatment Plant

The sewage treatment plant shown in the accompanying illustration consists of screen chamber, pre-aeration tank, and settling tank, together with sludge digestion tank, sludge drying beds and sludge pumps. Since the plant is located on ground subject to floods, it is surrounded by an earth dike and is provided with motor-operated inlet and outlet valves which automatically by-pass the plant when the flood level reaches that of the overflow weir in the settling tank.

A screen formed of Toncan metal bars set with 1-inch open spaces forms the first step in the treatment process. The screenings are raked off by hand twice each day onto a sloping concrete slab for drainage, and are disposed of by burial. The screened sewage is then aerated for a period of approximately 20 minutes in a rectangular concrete tank. Compressed air is produced by a small Connersville rotary blower located in the sludge pump house, and is introduced through porous plates set in the tank bottom. The primary purpose of pre-aeration here is to reduce the odors from the settling process, but it is found that the agitation caused by the rising air-bubbles not only removes the disagreeable odors, but also facilitates scum removal and has a marked beneficial effect on settling. Tests on composite samples collected shortly after the plant was completed showed reductions of 54 per cent in the 5-day biochemical oxygen demand, and 78 per cent in suspended solids by the combined pre-aeration and settling processes. These reductions are considerably higher than can be expected from settling alone.

After aeration, the sewage is settled for a period of approximately two and a half hours in a settling tank or clarifier fitted with Dorr mechanical equipment for sludge concentration and removal. The tank is rectangular in plan and the sewage enters through four submerged and baffled inlets and is drawn off over a weir into an effluent channel which leads to the outfall sewer.

The sludge which accumulates in the bottom of the clarifier is pumped to the sludge digestion tank by means of a Barnes motor-driven sludge pump of the plunger type, operated through a G-E time switch, which automatically starts and stops the pump at predetermined intervals.

The sludge digestion tank is a circular, covered concrete tank fitted with rotating arms which break up the scum on the surface and sweep the heavier bottom material toward the outlet pipe, which is located in a cone-shaped hopper in the center of the tank. This tank is also equipped with a water-sealed collection dome, from which a gas line leads to a Bryant hot water boiler. The gas evolved during the digestion process is utilized for maintaining the temperature within the tank above 70 degrees F. Three hot

water coils of 1½-inch Arco pipe are suspended on the inside walls of the tank.

Four sludge drying beds of sand underdrained by tile lines have been provided, and it is probable that the sludge produced will be disposed of as fertilizer. Three hydrants have been provided, so that city water under pressure is available at any part of the plant, and the daily "hosing down" of the tank walls and other parts of the plant has been a large factor in the maintenance of odorless operation.

The sloping earth fills were left to settle during the fall and winter, and have been seeded this spring. The beautification program of the plant operator has already been started by setting out three circular flower-beds near the screen chamber.

This plant was constructed by John Carrothers, Topeka, Kans., under the supervision of Black & Veatch, consulting engineers, of Kansas City, Mo. The total cost of the plant was approximately $52,500. The elected City Commission spent a great deal of time in handling the numerous details incident to the consummation of this project, thus insuring its successful construction and operation.

Street Sanitation in Kenosha

Department of Public Works Has Accurate Records of Activities and Costs for 1931

STREET sanitation in Kenosha takes the form of machine and hand sweeping of streets, snow and ice removal and, during the summer, sprinkling of streets and application of calcium chloride to alleviate the dust nuisance.

Street Sprinkling

Street sprinkling has been confined principally to unpaved streets. By operating the two motor pick-up street sweepers, it was possible to keep the pavements quite free from dirt, and therefore to greatly lessen intensive street sprinkling on paved streets during 1931.

The necessity for sprinkling dirt streets was due to the paving of streets and other improvements which diverted traffic over certain dirt streets in the vicinity of the paving plants and material yards. The dirt streets, at times, became very dusty and were sprinkled to control this nuisance as much as possible. The cost of street sprinkling, including the application of calcium chloride, during 1931, was $133.08. The application of calcium chloride was substituted for street sprinkling on several streets because of the greater permanency and efficiency of the chloride application. Where property owners request the application of the chloride, the city does this work without any cost to the property.

Snow and Ice Removal

Snow and ice removal in Kenosha includes removing snow in the commercial sections of the city, plowing in the outside sections, and removal from sidewalks where the owner neglects this civic duty. The cost of this item is divided as follows:

	Field Labor	Equipment Expense	Total Cost	Average Haul, Feet	Cubic Yards	Curb Miles	Cost Per Cu. Yd.	Cost Per Curb Mile
Machine snow removal	506.20	669.10	1175.30	3923	7202	16.20	0.163	72.50
Hand snow removal	893.55	340.20	1233.75	1980	3312	3.03	0.373	407.18
Snow plowed (not removed)	266.25	290.70	556.95			637.		.087

Cost of removal from streets	$2,966.00
Amount on tax roll	2,073.25
Cleaning city property	128.41
Total cost of snow and ice removal	5,167.66

Sewer and Catch-Basin Cleaning

During 1931, inspections were made of the entire sewer system, approximately 115 miles, and wherever sediment or other deposits were found, the sewers were cleaned and flushed with water from the fire hydrants. The cost of this work was as follows:

Labor	$10,223.51
Material and supplies	2,456.07
Auto repairs	1,105.90
Gas and oil	521.60
Insurance	9.50
Repairs	233.18
Water	468.29
License	1.00
Sundry	29.00
Freight and drayage	2.81
Accounts payable	57.13
	$15,107.99

This amount also includes the cost of catch-basin cleaning. During the last year, 3,727 catch-basins were cleaned, 3,695 by machine and 32 by hand because their location made machine cleaning impractical. The average length of haul from catch-basins to dump was 2.75 miles.

	Number Cleaned	Cost	Cost per Basin	Yards Removed	Cost per Yd., Including Removal of Waste
Catch-basins cleaned by machine	3,695	$4,353.33	$1.17	3,488	$1.25
Catch-basins cleaned by hand	32	82.06	2.56	37	3.04

Machine Sweeping

The street-cleaning equipment of Kenosha consists of two motor pick-up sweepers, each of which is operated by one man. When the hoppers of the sweepers are filled, the sweepings are dumped on the street in the gutter. A truck with two men and a driver follows closely behind

and picks up the sweepings and hauls them to the nearest dump. As there is considerable demand for the sweepings by owners of low lots, the sweepings are hauled to these lots, or to the lake front. By this arrangement the Department takes advantage of short hauls, and lot owners get filling without cost to them. One truck and crew disposes of the sweepings from both sweepers, which requires about 4 hours per day, except during a period of about one month in the fall when leaves dropping from the trees make is necessary to add another unit. This extra unit is also required for a period of about two weeks during the spring clean-up to pick up the winter's accumulation of débris.

The business section of the city is swept daily between the hours of 5 and 7 A.M. There are few cars parked on the streets between these hours to interfere with the free movement of the machine sweepers. Other sections of the city are swept once each week.

The cost of operating the motor sweepers and disposing of the sweepings amounted to $5,276.43 for sweeper No. 2 and $6,379.93 for sweeper No. 3. This includes field labor, gasoline, oil and grease, repair labor, repair parts, brooms, water and disposal costs, plus interest and depreciation on the two units. For sweeper No. 1 the cost per cleaning mile, including interest and depreciation, was $2.19. The cost per cubic yard, including interest and depreciation, was $1.54. The cost per cleaning mile, exclusive of interest and depreciation, was $2.05; and the cost per cubic yard under the same conditions was $1.44. For sweeper No. 3 the cost per cleaning mile, including interest and depreciation, was $2.52. The cost per cubic yard, including interest and depreciation, was $1.69. The cost per cleaning mile, exclusive of interest and depreciation, $2.12; and the cost per cubic yard, exclusive of interest and depreciation, $1.42.

Hand Sweeping

In addition to the force and equipment mentioned, one hand sweeper is kept in the downtown business districts to keep the streets and alleys clean, and one man in each of the north, south and west side districts to keep the crosswalks clean. These men cover such areas as are not accessible to the sweepers. A one-ton truck is employed to pick up the sweepings gathered by the hand sweeper in the downtown district.

The cost of hand sweeping and hauling away the sweepings during the year 1931 totaled $5,741.08.

The New Water Supply of O'Fallon, Illinois

Construction, One Year of Operation, and Financial Data

By **JOHN A. FULKMAN**
Consoer, Older & Quinlan, Inc., Consulting Engineers, Chicago, Ill.

O'FALLON completed a new water-supply system in the late fall of 1930. The first year's operation of the system has been so successful from every standpoint, including income, that it is thought the experience may be of interest to other small cities contemplating water-supply improvements.

O'Fallon is about 15 miles southeast of St. Louis, Mo. The 1930 population was 2,373. The principal industry is coal mining. In recent years there has been an increasing tendency for people employed in East St. Louis and St. Louis to locate in O'Fallon. This is no doubt largely due to O'Fallon's location on high ground about 150 feet above the Mississippi River; also to good roads and transportation; to its nearness to St. Louis; and to the new water supply.

The old water-supply system consisted of a supply from an abandoned coal mine shaft 36 feet deep, about 20,000 feet of 4- to 8-inch diameter distribution mains, and a 58,000-gallon elevated tank. The water from this source was scant and very hard, and contained a high amount of iron.

Three New Sources Considered

In planning the new water works, three sources of supply were considered, namely, wells, small surface streams, and the East St. Louis and Interurban Water Co. A well supply was not developed, because it was inadequate in quantity and the water poor in quality. A surface supply was not used, because of the high construction and annual operating costs. It was decided to build about 8 miles of pipe line toward East St. Louis and secure water from the East St. Louis and Interurban Water Co. Although the cost of the water from this source seemed somewhat high, this scheme had the advantage that the water was good from a sanitary standpoint and reasonably soft; and also there were about 150 possible customers along the supply pipe line to O'Fallon. Seventy-nine of these are now water users, and more are anticipated. The supply secured is Mississippi River filtered water.

The new water works consists of slightly over 8 miles of 10-inch supply line and about 10,000 feet of additional distribution lines in O'Fallon, as well as new meters, valves and hydrants.

Construction

The total cost of the new system, including all contingencies, engineering and legal expenses, was slightly less than $120,000. Bids were received on several different kinds of cast iron pipe and also alternates on different joint materials. De Lavaud centrifugally cast iron pipe and Leadite joints were used on the work. There was a saving of $10,000 on this job by the use of De Lavaud centrifugal cast pipe, compared with using standard Class C and D pipe. Also there was a saving of $4,000 by using Leadite joints instead of lead joints.

The job was financed by issuing water revenue bonds in accordance with the Illinois 1927 Water Revenue Bond Law. The contractor was paid in bonds, which run from three to twenty years and are arranged so that the annual payments for interest and retirement of bonds are practically equal throughout the twenty-year period, with slightly less annual payments for the first few years. The 1927 law referred to limits the maturity of the bond to twenty years. However, the old Illinois so-called Water Certificate Law has now been revised, effective July 1, 1931, permitting forty-year bonds.

The specifications called for a maximum leakage in the cast iron lines of not over 150 gallons per inch-mile diameter. The actual leakage tests showed only 75 gallons per inch-mile diameter. The tightness of the water mains is also evidenced by the fact that the difference between water purchased and billed by individual meters shows a loss of only about 5 per cent. The city is 100 per cent metered.

Construction of the water works started July 1, 1930, and was completed November 9, 1930.

Operation

The 10-inch supply line was laid from French Village to O'Fallon along concrete highway Illinois 12, U.S. 50. The minimum pressure to be maintained according to the contract with the East St. Louis and Interurban Water Co. is 120 pounds at French Village. This pressure is sufficient to carry the water to O'Fallon and have about 75 pounds available in O'Fallon. The elevation of the meter vault at French Village is approximately 440, and the general elevation in O'Fallon is 550. Two check valves were installed in the 10-inch supply main, one at the meter where water is purchased at French Village, and one at the city limits of O'Fallon. A Ross Valve Manufacturing Co. altitude control valve is installed on the line at the elevated tank to shut off the flow when the tank is full. This valve opens again when the pressure on the city distribution side has dropped ½-pound. Gate valves were installed on the supply line at intervals of about a mile.

Tests of fire flows and pressures were run on January 28, 1931. In the center of the city the static pressure was 75 pounds. The flow with one 2½-inch hose connection open was 915 gallons per minute, and the residual pressure, or pressure with the hose connection open, was 40 pounds. The advantage of an elevated tank is shown by the fact that a test with the tank shut off, and only the 10-inch supply main delivering water, gave a residual pressure of 20 pounds and a flow of 455 gallons per minute. Also, the improvement effected by the new 10-inch supply line is shown by the fact that a test by the Illinois Inspection Bureau a few years ago showed only about half the quantity at the same location. The elevated tank was also in service when the Illinois Inspection Bureau test was made.

The amount of water purchased for the first year was approximately 23,000,000 gallons. This gives an average use of 63,000 gallons per day, and a per capita consumption of 23 gallons per day. The per capita consumption is based on the 1930 population of 2,373 plus 327 outside the city, a total of 2,700 persons.

Financial Data

The rate for water varies from 50 to 18 cents per 1,000 gallons. There is a minimum charge of $2 per month per customer, and a charge of $40 per year for each fire hydrant. In designing the rate schedule, it was felt that rates should be established sufficient to take care of all operation charges and payment of interest and bonds. The City Council realized that while there would be no direct reflection or obligation on the city if the revenue was not sufficient to take care of annual operating costs, there would be a moral obligation and an indirect reflection on the city's credit. Also, it was necessary to produce an income large enough to make the bonds attractive to investors.

The collections for the first year's operation are about $13,250. They have steadily increased each quarter, from approximately $2,700 for the first quarter to $3,900 for the fourth quarter. The number of customers increased from 325 at the beginning of the year to 447 at the end of the year.

The cost of the water purchased from the East St. Louis and Interurban Water Co. for the year was slightly less than $4,200, or about 18 cents per 1,000 gallons. The meter reading, repairs, clerical work, and collections cost about $1,000 a year. The water is delivered at sufficient pressure in O'Fallon, therefore there are no expenses for pumping or operating labor.

A total of $119,000 in bonds was issued. These bonds bear 6 per cent interest, which makes an annual interest of $7,140 until the first bonds are paid off in 1932. The interest and bond payments and the cost of purchasing water are the major items of expense. The amount of interest and bond payment does not exceed $10,000 a year for most years and is never more than $12,000 per year during the twenty years.

The rapid increase in income during the first year's operation indicates that there will be sufficient funds available to meet the annual operating expenses, including interest and bond payments.

Personnel

The local organization of business men was active in cooperating with the City Council in the city's efforts to secure a permanent, safe, and economical water-supply system.

The first year's operation has proved very satisfactory and is a source of much pride to the City Council, the business men, and all the citizens. While many cities throughout Illinois and the Middle West were suffering from acute shortage of water, bad tastes in water supply, high operating costs, and other evils resulting from the 1930-31 drought, O'Fallon had every reason to congratulate itself on its freedom from such worries.

The contractor was The Merkle Construction Co., of Kansas City, Mo. Consoer, Older and Quinlan, Inc., of Chicago, were the engineers.

KENTUCKY EXECUTIVES ORGANIZE

At a recent meeting held in Frankfort, plans were completed for organization of the Kentucky Commercial Executives Association, with the following officers: President, E. D. Wilder, Lexington; Vice-Presidents, H. B. Skinner, Newport (for Northeastern Division); R. A. Blair, Corbin (Southeastern Division); W. E. Morrow, Louisville (Central Division); J. M. Nelson, Bowling Green (Southwestern Division). H. B. Skinner will act as Secretary-Treasurer. A mid-year meeting will be held in Louisville in July.

Twenty-Foot Waterway Covered to Form Paved Streets

By WALTER STEGMAN
Engineer for Ohio County, W. Va.

BEFORE IMPROVEMENT
The useful street width of Twenty-Ninth Street, Wheeling, W. V., was much reduced by the open waterway and the iron guard fence (above). Only one side of the roadway was paved

AFTER IMPROVEMENT
The completed 40-foot pavement on Twenty-Ninth Street. Half of this pavement forms the cover for the new and wider waterway

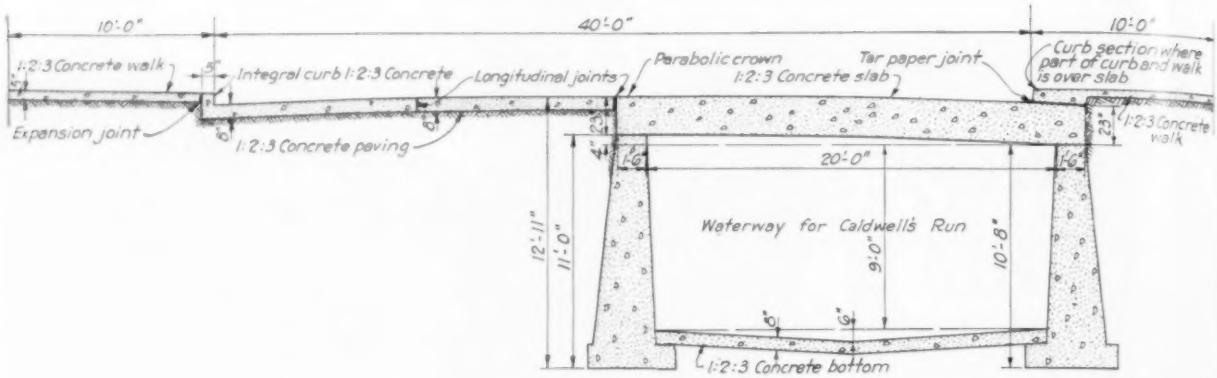
OHIO COUNTY, W. Va., recently added another entrance to the city of Wheeling when it widened 29th Street by covering a waterway with a slab which will serve as a pavement. The paved street width is now 40 feet, instead of the original 20, the additional 20 feet being a slab of concrete 23 inches thick, supported on abutments 20 feet apart. Two 10-foot sidewalks were also built, completely filling the right-of-way width of 60 feet. The project is 3,200 feet long, required 16,000 cubic yards of concrete and cost $245,000.

Twenty-ninth Street follows the gap in the Ohio River hills known as Caldwell's Run, which drains an area of 1,600 tree-denuded, precipitous acres. Before the recent improvement the street width was shared by a waterway, a 20-foot brick pavement and an 8-foot sidewalk. The waterway was formed by two retaining walls and a concrete bottom, but was not covered. It was separated from the roadway by an iron fence. The portion of the right-of-way on the other side of the channel was unimproved, but was occasionally used by the vehicles of those living along the street. The lots along both sides of the street are occupied by homes or business houses, and the run channel is used for both storm and sanitary sewage.

Design

Beginning at the east, or upper, end of the project, the new channel is 20 feet wide and 9 feet deep for a distance of 900 feet. At this point it is joined by a tributary and the depth is increased to 10 feet, the width remaining 20 feet.

The abutments for the run channel are 4½ feet thick at the bottom, battering to 1½ feet at the top, and are reinforced with ½-inch round bars spaced 12 inches center-to-center both horizontally and vertically and placed 4 inches from the face of the abutment. Thirty-inch tie bars spaced 12 inches apart were placed in the abutments, 6 inches above the footing, and at right angles to the line of the abutment. Reinforcement for the bottom is attached to these tie bars. Weep holes 4 inches in diameter were placed



CROSS SECTION OF WALKS, PAVING AND WATERWAY

10 feet apart and about 2 feet above the run bottom. The abutments were built in 50-foot sections with a ¾-inch felt expansion joint between sections.

Construction

After the abutments were built, an 18-inch pipe with open joints was laid in the center of the waterway, the top of the pipe being 3 inches below the bottom of the floor. During construction this pipe served to carry the normal flow of the channel, and since construction it has served as an underdrain for the floor.

The subgrade upon which the 8-inch concrete bottom was laid was prepared by removing all soft spots and water; then ½-inch round bars were placed 12 inches center-to-center in both directions and fastened to the tie bars protruding from the abutment. The floor was made 6 inches lower at the center than at the edges to concentrate dry-weather flows.

The slab forming the top of the waterway is designed to carry a double line of 15-ton trucks running parallel with the abutments. It is solid concrete 23 inches thick. The proximity of both cement and aggregates made this design cheaper than one of beam and slab construction requiring more form work.

This roof slab is reinforced with ⅞-inch round transverse bars spaced 4 inches apart, and ½-inch round longitudinal bars 12 inches apart. The slab was constructed in 50-foot sections conforming to the 50-foot sections in the abutment. Its surface conforms to the crown of the street. The slabs are separated by 1-inch expansion joints.

The other 20 feet of the roadway was laid on the usual soil subgrade and is concrete 8 inches thick, reinforced with wire mesh weighing 65 pounds per hundred square feet. It is divided into 10-foot longitudinal strips by a dummy center joint. Transverse expansion joints were placed at 33-foot intervals.

The concrete for pavement, sidewalks and the structure enclosing the waterway was all proportioned one cement, to two sand and three gravel. The batches were measured by weight.

Twenty-ninth Street connects with a recently constructed highway known as the Wheeling-Elm Grove Boulevard, built to relieve traffic congestion on the overcrowded National Road or U. S. 40.

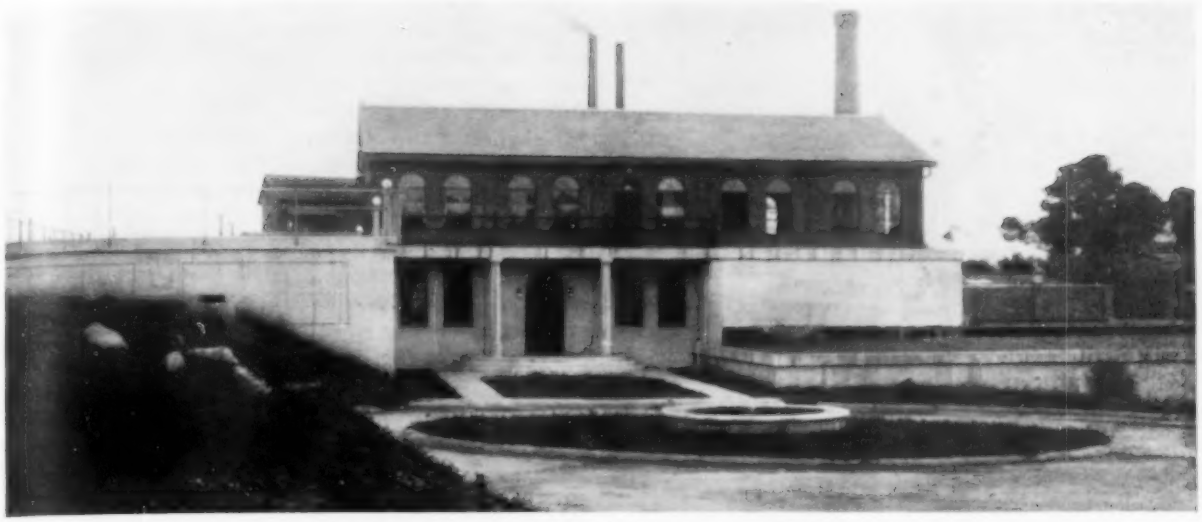
A Warning—Reduce Costs But Don't Ignore Quality

IN many fields of municipal activity there is a tendency today on the part of local officials to buy materials and equipment for the lowest price possible without due regard to quality. It is admirable that municipal officials should endeavor in these times to reduce city expenditures by careful purchasing, but it is exceedingly shortsighted for them to buy whatever is offered simply because it is cheap. There is a point below which a legitimate manufacturer cannot produce his goods from acceptable materials which will insure long life and satisfactory service.

It is not a theory but a proven fact, that cities will profit in the long run by making their purchases of material directly from responsible, respectable and ethical manufacturing concerns, instead of allowing irresponsible contractors to do the buying. Instances have been brought to light recently where municipalities and water departments have awarded contracts to contractors for the installation of pipe lines necessitating valves and hydrants, and have only specified the size and type to be purchased by the contractor without adequate specifications to protect the city from substitution or the purchase of inferior materials. This is a lamentable example of shortsightedness, for many products can be manufactured which look all right on the surface and which will last for a short time or until the contract price has been paid. "Out of sight, out of mind" is all too true in the case of many of our underground structures, but when high-pressure water comes boiling up through several feet of ground and gushes through the pavement, the city suffers from damage suits from the flooding of cellars, basements and warehouses, and damage to vehicles which may be in the immediate vicinity of the man-made geyser. Added to this are the expense of shutting off the line, the danger of depriving the section of water, increasing the fire hazard, and the cost of replacing the valves and repairing the pavement.

Another advantage of the purchasing of equipment direct from the manufacturer by municipalities and water-works departments is that it eliminates the credit hazards which manufacturers often have to accept when orders for both material and labor are placed with contractors. These credit hazards, or at least part of them, are passed on eventually by the manufacturers to the municipalities. By direct purchasing of materials on the part of the city, as well as proper protection of the city by careful specifications, poor materials can be eliminated and unethical substitution made impossible.

City officials, think this over in making your purchases. A product of quality and established merit well bought protects the reputation of your city as well as your own reputation for reliability and fair dealing.



FRONT VIEW OF THE MURFREESBORO, TENN., FILTRATION PLANT

Making Over a Municipal Water Works

By **C. N. HARRUB, M.Am. Soc. C.E.**
C. N. Harrub Engineering Co.,
Consulting Engineers,
Nashville, Tenn.

THE original water works system of the city of Murfreesboro, Tenn., was installed by a private water company. Water was obtained from a spring near the southern boundary of the city. This spring is subject to considerable contamination by surface drainage which enters through sink holes, and at times is extremely turbid. Pressure filters were used to remove the suspended matter, and later a concrete basin was constructed in which sulphate of alumina was applied to the water to relieve the pressure filters of some of the burden of purification. Disinfection of the filtered water was first accomplished by the use of calcium hypochlorite and later by liquid chlorine.

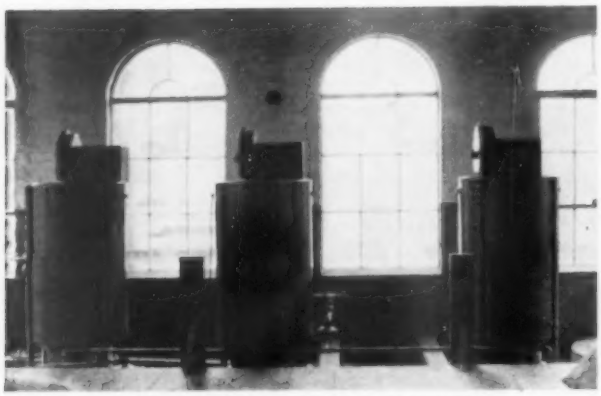
The system comprised a steam pumping plant consisting of two 150-hp. horizontal return tubular boilers, hand fired, a Platt Iron Works pump of 1,000,000 gallons daily capacity, a pressure filter, the distribution system and a small standpipe. The boiler plant and pumping station was a brick and frame building of cheap construction, poorly lighted and of extremely unattractive appearance. The plant was purchased by the city about 1922, after which certain improvements were made, including a new 8 x 20-foot horizontal pressure filter, and a new million-gallon Murray Iron Works pump driven by a Corliss cross-compound engine, and in 1927 a new 150-hp. boiler was installed. Extensions and replacements of mains were also made. The mains in the original distribution system were entirely too small for the growing community, and many of them had to be replaced in order to furnish fire protection. The standpipe likewise was so outgrown that it was difficult at times of heavy draft to meet the demand and maintain satisfactory pressure.

It became evident in 1927 that extensive improvements would have to be made at an early date if the city was to prevent a water famine. The C. N. Harrub Engineering Co., of Nashville, was engaged to make investigations and recommendations for improving the water supply system of the city, and in 1928 the firm was instructed to proceed with the design of a modern plant to replace the old one. Plans and specifications were prepared for the following improvements: two new boilers to replace the two old ones, the construction of a new chimney to serve all three boilers, the removal of the old pressure filters and enlargement and rebuilding of the boiler and pump house, converting the old filter room into a generator room; the installation of two generators; the construction of a modern filtration plant with sedimentation basin and clear water reservoir; the erection of an elevated storage tank and the construction of a belt line of pipe around the city to improve the pressure.

The Power Plant

The front of the old building was moved forward 16 feet to give additional coal storage and to provide more space in the generator room. The old brick partition between the boiler room and the filter room was found to be in such bad condition that it was torn out and replaced by a tile wall, and a new roof was constructed over the power house, after the old boilers and pressure filters had been taken out.

New Hedges-Walsh-Widener boilers of 150-hp. capacity each were installed to replace the old ones, together with a new Worthington Type N open feed water heater and a new feed water pump. In order to install the new boilers, it was first necessary to remove the old brick stack which served the original boilers. Fortunately, the boiler installed in 1927 was equipped with a steel stack, independent of the old brick stack, which made it possible to keep



THE CHEMICAL DRY FEED MACHINES

this boiler in service during the reconstruction period. The new chimney was located in the boiler room, and after the new boilers were connected and ready to operate, the steel stack of the other boiler was removed and this boiler also connected to the new stack.

Two 440-volt, 187.5-kva. General Electric generators driven by Skinner Universal Unaflow engines were installed to produce current for lighting the plant and driving the new centrifugal pumps, and a switchboard consisting of two main panels and a feeder panel.

The engines are equipped to run condensing or non-condensing, and are connected to an Elliott condenser of sufficient capacity to produce a vacuum of 26 inches when both engines are in operation. Water for the condenser is furnished by the low-lift or raw-water pumps, which are located in a pump pit at one side of the generator room. There are two of these Dayton-Dowd centrifugal pumps of 1,000 g.p.m. capacity each, driven by 30-hp. electric motors.

The Filtration Plant

As it was necessary to maintain the old plant in operation until the new one was ready for service, construction was commenced on the filtration plant. In view of previous experience in construction work in the city, it was expected that a solid rock foundation would be found at the grades determined upon for the bottoms of the sedimentation basin and clear water reservoir, but instead a most unsatisfactory condition was encountered. The rock, a hard limestone, was found to be badly creviced, and full of solution channels produced by the flow of water at some remote time. These crevices varied from a few feet to nearly 8 feet in width and from 2 to 10 feet in depth, and unfortunately the widest and deepest was directly along the line of the columns supporting the filters. The crevices were filled with a soft clay mud, into which a half-inch rod could be easily forced to a depth, in some places, of 10 feet or more. As this was below ground-water level, it was entirely unsatisfactory as a foundation for a reservoir, and as the condition seemed to get worse as the excavation deepened, the whole plant was raised 18 inches above the proposed grade.

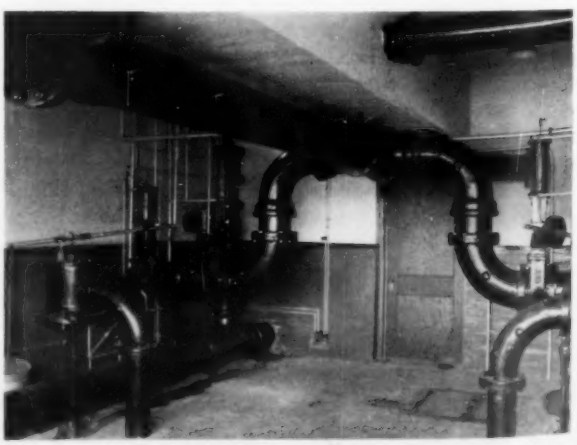
The entire area of the sedimentation basin and clear water reservoir was then core drilled to determine what depth of rock was available. Drill holes were carried to a depth of 20 feet unless a continuous depth of 10 feet of solid rock had been found in less than the 20 feet. Pits were then excavated at column sites, removing all loose or thin layers of rock down to the 10-foot layer, and the reservoir bottom redesigned to meet these conditions, carrying the columns down to the solid rock, and placing reinforced concrete girders under the floor. The core drilling and extra work in foundations delayed the construction about two months.

The filtration plant consists of two sedimentation basins of 125,000 gallons capacity each; four rapid sand gravity filters of 500,000 g.p.d. capacity each, and a million-gallon reinforced concrete clear water reservoir. An over-and-under baffled mixing chamber extends between the sedimentation basins and is provided with a drain for cleaning purposes.

The sedimentation basins are round-the-end baffle type, with a distributing weir and stilling wall at the inlet end, and a collecting weir at the outlet end. The water enters the mixing chamber inside the building in an open trough and through a vertical pipe entering the bottom of the trough. The chemicals are added immediately above the inlet pipe, Wallace & Tiernan Type O dry feed machines being used for this purpose. There are two machines for feeding alum and one for feeding lime.

Between the sedimentation basin and the clear water reservoir are the pump room and the chemical feed and storage room. The former is on the first floor, and the latter on the second floor. The present pumping equipment consists of a 1,000 g.p.m. fire pump designed to give 100 pounds pressure at the Court House Square; a 1,000 g.p.m. high-service pump, and a 2,750 g.p.m. wash-water pump for washing the filters. Space is provided for two additional 1,000-gallon high-service pumps. All these are Dayton-Dowd centrifugal pumps direct-connected to Lincoln motors. Directly above the pump room is the chemical storage room, on the same elevation as the operating floor of the filters. The pipe gallery is on the same floor as the pump room, from which it is entered. At the opposite end a window extends across the full width of the gallery, which makes it an unusually well-lighted gallery, with as much light as any part of the plant. It is also designed for easy access to valves, piping and rate controllers, and all parts can be easily reached without climbing over or under any piping.

The filters are directly over the clear water reservoir, and each filter has an independent discharge into the reservoir. They have a sand area of 12 x 15 feet, and are



THE PIPE GALLERY
Showing the rate controllers and hydraulic valves

equipped with perforated cast iron laterals, operating tables and hydraulic valves, Simplex rate controllers with automatic cut-off, indicating rate of flow and recording loss of head gages.

The office and laboratory are between the filter operating room and the chemical storage room, one on each side of a hall leading to the latter. This entire building, as well as the new generator room, is heated by steam, using Thermolier unit heaters.

The new filtration plant was put in operation in September, 1930, after which the construction of the new power plant was started. The building was completed and the generators put into service in 1931.

As now equipped, the city of Murfreesboro is unusually well protected against any possible suspension of water service. There are now three boilers, any one of which is capable of carrying the present load, duplicate generators and duplicate low- and high-service pumps electrically driven, and in addition a complete steam system. The old Platt Iron Works pump formerly used as a high-service pump has been connected up as a low-lift pump discharging into the settling basins, and the Murray Iron Works pump has been retained as a standby high-service pump. Few towns of the size of Murfreesboro can boast of two complete plants, one steam and the other electrical, the latter also in duplicate.

The Distribution System

In addition to the complete rebuilding of the power and filtration plants, the distribution system was improved by the construction of an elevated steel tank and a feeder main. The tank has an ellipsoidal bottom and a capacity of 500,000 gallons. The tower is 100 feet high to the bottom of the tank.

The feeder main consists of a 12-inch main from the filtration plant to the elevated tank approximately a mile away, and an 8-inch main around the other three sides of a rectangle so as to form a belt around the city. The line is connected to all old lines which it intersects. The result of constructing the elevated tank and large main has been to nearly double the pressure in the business section of the city. All water leaving the plant is measured by a Builders Iron Foundry venturi meter with Type M recording instrument.

Cost

The total cost of the improvements was $266,412.09, which was distributed as follows:

Filtration plant	$121,237.97
Power house and equipment	74,953.95
Elevated storage tank	26,574.83
Distribution system	43,645.34
	$266,412.09

The total engineering costs, including surveys, design, supervision of construction and inspection, were $18,897.86, or 7.18 per cent of the cost exclusive of cost of real estate.

The design and supervision of construction were by the C. N. Harrub Engineering Co., of Nashville, Tenn., with Edward H. Deets resident engineer in charge. The plant was constructed under contract by the following concerns:

General contract, including filtration plant complete, power plant building and pipe lines—V. B. Higgins & Co., of Charlotte, N. C.

Power plant equipment, including boilers, feed water heater, generator sets and switchboard and pumps—The Nashville Machine & Supply Co., of Nashville, Tenn.

Chimney—Alphons Custodis Chimney Co., of Atlanta, Ga.

Elevated steel tank—Chicago Bridge & Iron Works, Chicago, Ill.

Another Good Billboard Decision

THE case of *The Packer Corporation v. State of Utah*, decided February 23, 1932, by the United States Supreme Court, gives further encouragement to the fighters against the billboard blight.

The decision affirms the constitutionality of the Utah statute (L. 1921, Chap. 145, Sec. 2, as amended by L. 1923, Chap. 52, Sec. 2, and by L. 1929, Chap. 92) making it "a misdemeanor for any person, company or corporation to display on any billboard, street car sign, street car, placard, or on any other object or place of display, any advertisement of cigarettes, cigarette papers, cigars, chewing tobacco, or smoking tobacco, etc.," and disposes of the contention that, because the posters or cars are shipped in from outside the state, the display of such advertising is interstate commerce or is beyond the police power of the state to regulate or prohibit. "The prohibition is non-discriminatory, applying regardless of the origin of the poster. Its operation is wholly intrastate, beginning after the interstate movement of the poster has ceased."

But to opponents of the billboard nuisance the chief interest of the decision will lie in the new ground recognized by the Supreme Court for placing outdoor advertising in a class by itself, subject to its own special regulations and controls, regardless of whether or not similar restrictions or prohibitions are placed on other advertising media.

Quoting with approval from the opinion of the Supreme Court of Utah (297 Pacific Rep. 1013) Justice Brandeis, writing for a unanimous court, says:

"Moreover, as the State Court has shown, there is a difference which justifies the classification between display advertising and that in periodicals or newspapers: 'Billboards, street car signs, and placards and such are in a class by themselves. They are wholly intrastate, and the restrictions apply without discrimination to all in the same class. Advertisements of this sort are constantly before the eyes of observers on the streets and in street cars to be seen without the exercise of choice or volition on their part. Other forms of advertising are ordinarily seen as a matter of choice on the part of the observer. The young people as well as the adults have those of the billboard thrust upon them by all the arts and devices that skill can produce. In the case of newspapers and magazines, there must be some seeking by one who is to see and read the advertisement. The radio can be turned off, but not so the billboard or street car placard. These distinctions clearly place this kind of advertisement in a position to be classified so that regulations or prohibitions may be imposed upon all within the class. This is impossible with respect to newspapers and magazines.'"

This case, indeed, adds two authorities to the growing list of those standing for the proposition (abhorred by all billboard men) that outdoor advertising is in a class by itself and is thus subject to its own special regulation under the police power; for the passage above quoted is the language both of the Utah Supreme Court and of the United States Supreme Court.

The United States Supreme Court has taken this position at least twice before (*Cusack Company v. City of Chicago*, 242 U. S. 526; 529; *St. Louis Poster Advertising Company v. St. Louis*, 249 U. S. 269; 274). Missouri (in the case last cited, 235 Mo. 99; 192), Indiana (*General Outdoor Advertising Company v. City of Indianapolis*, 172 N. E. Rep. 309) and now Utah, are on the list. Heretofore, the classification has been based on the boards' being a special kind of *structure*, different from buildings. The separate classification is now based on a new and second factor—the purpose and use of such structures, and their effect on the beholder.

ALBERT S. BARD.

THE CIRCULAR DISCHARGE OF THE COMBINED AERATOR AND CHEMICAL MIXING DEVICE

Iron Removal without Filtration

By **E. T. ARCHER**
E. T. Archer & Company, Consulting Engineers, Kansas City, Mo.

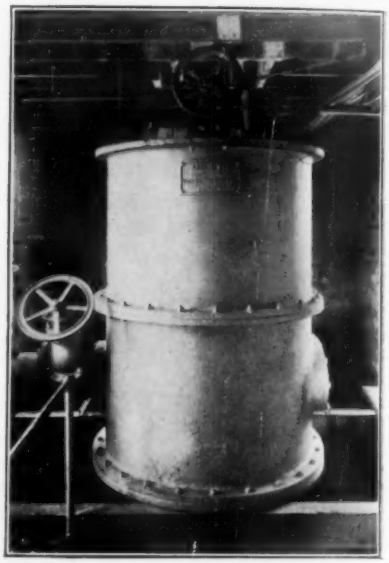
THE larger portion of the penal institutions of the state of Kansas, including the Women's Industrial School and the Penitentiary proper, are located at Lansing, Kans., a small community some twenty miles north of Kansas City. The average population of the Penitentiary and Industrial School is about 2,500, which, when added to the number of residents in Lansing, gives a total of 3,400 people for the district.

The Penitentiary is almost a complete community. It owns and operates its own coal mine, its own power plant, its own truck garden, and one of the largest binder twine plants in the world; and, in connection with these industries, it owns and operates a water system that supplies not only the Penitentiary but the Industrial School and the city of Lansing as well.

Improvement in this water supply became imperative, but as the amount of funds that can be raised by taxation is limited, no money could be secured to build filters. Ordinarily a city can raise the rates, but for the Penitentiary, this would merely be a bookkeeping item that would carry no cash dividends. An appropriation from the Legislature was almost impossible to secure, since few could see any point in spending money on the prisoners other than for the simplest necessities of life; and as for a purification plant adequate for a town of 3,400 people—that was out of the question.

Source of Water Supply and Early Treatment

At that time, the Penitentiary, the city, and the Industrial Farm were using about 600,000 gallons of water per day. This supply was pumped from seven or eight drilled wells in the Missouri River bottom, about one mile east of the Penitentiary proper. It was raised by vertical turbine pumps to a two-million-gallon masonry reservoir, on a hill, where, just before its discharge, it was dosed with lime and alum from two wet feed machines. It was then discharged over a splash-pan aerator, collected and led down a short flume into the reservoir, cascading over a stone wall at the entrance. After the water passed the basin, hydrochloride of lime was applied by the wood-barrel and spigot method, with little or no provision for accurate control. The water then flowed by gravity to the distributing system.



THE AER-O-MIX HEADER TANK FOR 1,050-GALLON PUMPING UNIT

In theory, the aeration caused the carbon dioxide in the water to be reduced, and the iron, of which there were about 7 p.p.m., or about 51 pounds per million gallons, would be thus precipitated in the basin. In practice, about the only result achieved was that of gravity distribution. The water was bad from a chemical, a bacteriological and every other point of view. It was still high in free carbon dioxide, and often the iron content of the tap water was higher than that of the raw water, indicating that the pipes in the distributing system were gradually going into solution. The taste was terrible. Aeration, even though 11 feet of head had been utilized, was insufficient. Sedimentation, which by the displacement method gave more than a three-day period, was in practice less than two hours, owing to short-circuiting. Experiments indicated that the partially aerated water flowed direct to the chlorinating chamber, leaving dead spots of stagnating water at the edges of the basin. The entire picture presented was distressing.

Economical Improvements

It was realized by the State Board of Administration—which, incidentally, has been constantly alive to any betterment that would solve the problem of dealing with the state's unfortunates—that some steps would have to be taken to improve this supply, but only the sum of $7,000 was available, and a filtration plant, on the usual basis of $40,000 per million gallons, would cost three times this amount.

At this time, the firm of E. T. Archer & Co. was retained and instructed to secure better water at an expenditure of not more than $7,000. After some study, and consulation with the Warden and the Engineer of the State Board of Health, it was decided to spend the available funds in making the following improvements, with the idea that if this did not secure a potable water, they would still be of material benefit if the filtration plant was finally constructed: (1) install positively operating aeration equipment to remove the maximum amount of carbon-dioxide from the raw well water with the use of about half the head previously required, thus increasing the capacity of the basin by 4 feet in depth; (2) furnish accurate measurement and thorough mixing of the small amounts of lime and alum necessary to oxidize or flocculate the iron to where it would be settled quickly and easily; (3) rearrange the distribution of the settling basin to prevent short-circuiting and to secure elimination of the dead spots, which with the additional 4 feet of head secured would give ample sedimentation.

Some means of positive aeration seemed to be about the first requirement. As previously stated, the water was discharged over a splash-pan aerator, requiring some 6 feet of head, and was then allowed to cascade into the settling basin, requiring 5 feet of depth in the basin proper and incidentally cutting down the capacity of the basin by this 5 feet of depth. This reduced the capacity of the settling basin from 2,400,000 gallons, or roughly a four-day supply, to 1,750,000, or less than a three-day supply. A higher splash-pan aerator might have been built but would have required raising 600,000 gallons of water against an additional 6 or 8 feet of head at a cost of about $5 per month, with little increase in the positive aeration. If this type of aeration had been selected, it would have been necessary, in order to insure thorough mixing of the chemical, to include a baffled mixing chamber large enough to retain the water for a period of over one hour.

A study was made of the possibilities of installing an Aer-O-Mix unit, an apparatus for simultaneously aerating the water and mixing the chemical. This device, with a capacity of 1,050 gallons per minute, the approximate rate of discharge of the well pumps, requires only a total of 6 feet of head, which is the same amount formerly used with the splash-pan device. It is designed to take in a great volume of finely divided air at atmospheric pressure through a multiplicity of air tubes and to intimately mix this air with the raw water from the wells. At the same time, the lime and alum dosing, which is fed into the water before being aerated, is thoroughly agitated with the water and becomes an intimate part of the mixture. Thus thorough aeration and the chemical mixing are secured with a total loss of head of only 6 feet as against the 11 feet previously used.

In order to insure accurate proportioning of the chemical, two Omega dry feed machines, which would measure uniform doses of chemicals at low rates of flow, were installed and arranged to discharge direct into the inlet of the aerator, the chemicals being mixed while passing through this mechanism.

As an additional safeguard, a supplementary mixing chamber was installed to further mix the chemical and the water after leaving the aerator. It was also felt that it might be desirable at some time in the future to feed hydrochloride of lime in a dry state to the water before it entered the sedimentation basin, in order to insure a more intimate mixture of the chlorine, and for this reason additional mixing was required.

The entire sedimentation basin was thoroughly cleaned, all leaks were stopped, and piping, baffles, etc., were rearranged to secure efficient distribution throughout the entire area of the settling basin, in order that a larger portion of its capacity might be of efficient use.

The other improvements were completed during this period. The aerator was placed in operation, the new dry feed machines were installed, and better supervision of operation was afforded the plant.

The results have been even better than hoped for. Before these improvements were made, the settled water contained an average of about 2 p. p. m. of iron. The tap water at times showed as high as 10 p. p. m., discoloring the plumbing, piping and fixtures, and giving all the trouble ordinarily experienced from red water. The water was hard, difficult to use, and nauseating in taste.

Since the completion of these improvements, the iron content in the tap water has been reduced to less than 0.2 p. p. m., and the free carbon dioxide to a point where it

THE SEDIMENTATION BASINS AT THE KANSAS STATE PENITENTIARY, LANSING, KANS.

is not corrosive. The troubles from red water have disappeared. The water is palatable and pleasant to drink and use. Experiments indicate that the sedimentation basin is now 80 per cent efficient, a rather high figure for a basin of this kind. The chemical consumption has been reduced from 400 pounds per day to 100 pounds per day, and the chlorine feed is better controlled. The State Penitentiary now has a water system to which it can point with pride.

ACKNOWLEDGMENT.—From a paper presented at the 1932 Texas Water Works School.

False Alarms and How to Overcome Them

By **J. J. RYAN**

FALSE alarms are one of the most annoying problems confronting every fire department. There are few cities that have not been bothered by this trouble at some time or other and sought a means of eliminating it.

If the fire department is to render its greatest service to the taxpayers, there must be some way for the public to summon the department quickly and accurately. In the attempt to curb false alarms by making it harder to transmit an alarm, not only is the efficiency of the fire department decreased by delay in its arrival at fires, but the incentive for sending false alarms is increased, the added difficulty making the act more of a sporting proposition. The same instinct that causes an adult to gamble also causes a youngster to sound a false alarm and take a chance of being caught.

It has been found that the quickest and most reliable means for calling out the fire department is through the fire-alarm box, which must be readily available at all hours of the night and day throughout the year in high-class residential sections, business districts and the poorer residential localities alike. Naturally, under such conditions the fire-alarm system can be expected to contribute the majority of the false alarms. The telephone, however, produces its share, principally through pay stations, because of the difficulty in tracing the offender.

Four Classes of Offenders

An analysis of the sources of false alarms discloses that, aside from those alarms which might be termed "needless" and which are transmitted by well-meaning people who mistake steam for smoke or the reflected light of a setting sun on windows for fire, there are four distinct classes of false-alarm offenders.

1. Inquisitive children and grown-ups who accidentally transmit false alarms through newly installed boxes while satisfying their curiosity.
2. Mischievous boys or young men of school age who are looking for excitement.
3. Demented adults who derive pleasure out of transmitting false alarms.
4. Inebriates, disgruntled ex-members of the fire department, or some one having a fancied grudge against the department.

Of this classification, groups 1 and 4 contribute the fewest false alarms, the bulk of the guilt being on the other two groups.

Practical Ways of Reducing False Alarms

With the sources of the trouble established, it is a much simpler matter to arrive at some plan for reducing the number of false alarms. It is very difficult to reduce the number falling under group 1. However, the total from this source is generally small and it is seldom that an offender repeats. An announcement in the daily newspapers, just prior to the installation of new boxes, informing the public how the box is operated and pointing out the hazards of false alarms, will almost always produce the desired results.

Group 2 presents a problem in a little educational work. The false-alarm habit among this group can easily be reduced and practically eliminated if a member of the fire department visits each classroom once a year to instruct the school children in the proper method of operating a fire-alarm box and point out the dangers of a false alarm. In Utica, N. Y., a couple of years ago, during an epidemic of false alarms, it was decided that the source of the trouble was the school children. After a number of talks by firemen and public officials in the schools, false alarms were reduced from 50 in one year to 6 in a similar period. Many other cities have had the same experience.

One fire chief faced with this problem asked the children in each classroom, during the demonstration, whether they knew any firemen. This usually developed the fact that they did or that the children of a fireman were members of the class. He then proceeded to show them how a fatal accident might occur to a fire truck on its way to answer a false alarm and that a playmate's father on that truck might be killed or crippled for life. Such an example was not only dramatic, but it made a profound impression on the children.

The offenders in groups 3 and 4 present the most difficult problem to handle. Because they involve adults of warped mentality, it is impossible to educate or reason with them and to present the case to them in a group as with school children. This leaves only one road open—recourse to the law. Many cities have ordinances which provide a penalty for false-alarm offenders—a fine, imprisonment or both. Most of these ordinances are either weak, providing a very small fine or a very short jail sentence, or are not as rigidly enforced by the courts as they should be.

At least one state, Missouri, has enacted state-wide legislation on this subject. This statute calls for the most severe penalty of all ordinances and legislation—a maximum sentence of three years in the penitentiary or a fine of not more than $500 or imprisonment in a city or county jail, not exceeding six months, or both fine and imprisonment.

The nearest approach to the Missouri state law is the model false-alarm ordinance drawn up by the New York

State Conference of Mayors and Other Municipal Officials. This ordinance provides penalties the minimum level of which is $10 fine, 10 days' imprisonment, or both. The exact penalties, subject to the foregoing limitations, are left to the discretion of the municipality adopting the model ordinance. The ordinance also includes a clause covering persons caught tampering with wires and other fire-alarm apparatus.

A false-alarm ordinance or statute should carry a severe penalty and to be effective should be enforced by the courts. In stressing the need for severe penalties, it should be kept in mind that this applies only to the hardened adult offender; juveniles should be handled firmly, but naturally not on such a harsh basis.

Effect of Holiday Celebrations

Holidays such as the Fourth of July, New Year's Eve, Hallowe'en and election days invariably bring about a sudden jump in the number of false alarms. To curb these, the public should be appealed to through the newspapers. In Cambridge, Mass., a unique and effective method was used on Hallowe'en by Fire Chief James M. Casey. He had cards printed with the wording, "A false alarm may cost a human life; think it over before pulling the lever." He turned these cards over to the Boy Scouts, who tacked one over each fire-alarm box. The result was startling. Only one false alarm was received, against large numbers in other years.

Impractical Attachments

Since the origin of the fire-alarm system, many ingenious devices for apprehending persons sending in false alarms have been developed. There was the net that descended upon a person operating a box, entrapping him until the arrival of the firemen. There was a "trick" arrangement that handcuffed any one sending in an alarm. A German recently devised a method of automatically fingerprinting the operator of a fire-alarm box. In New York a movie camera erected above a box, producing a motion-picture record of the person caught in the act, was tried out. In Fresno, Calif., I believe, another scheme furnished a still picture of the culprit. Most of these schemes were impractical because they furnished the mischievous and malicious element with a desire to outwit the fire and police departments. The addition of these devices to fire-alarm boxes not only is expensive, but tends to discourage good citizens from using the box. No person knowingly cares to subject himself to being handcuffed to a fire-alarm box in a heavy downpour of rain late at night and in scanty attire, and most people would hesitate to submit themselves to fingerprinting. Yet, a person wearing gloves or using a handkerchief to operate the fingerprinting box would render it ineffective. Likewise, holding a hat over the lens of the camera, or standing just outside its range, would make it possible to operate a box without leaving the evidence behind. By using a stick to operate the handcuff box, malicious alarms could still be sent.

Bells that ring when a fire-alarm box is tripped have proved ineffective during thirty years of trial. They, too, tend to increase rather than diminish this nuisance. It is quite evident, therefore, that the use of "trick gadgets" should be avoided.

In conclusion, there is a great need for an analysis of the sources of false alarms so as to determine the cure, rigid state legislation or at least strong municipal ordinances with "teeth" in them, proper educational work, and the avoidance of ingenious schemes or box attachments for trapping false-alarm offenders. Although it is seldom that false alarms can be completely eliminated, they can be reduced to a minimum by following the methods outlined.

Support Your Community Child Health Program —It Protects Your Home

THIS is the slogan chosen for May Day—National Child Health Day 1932 by the May Day Committee of the State and Provincial Health Authorities of North America. Among the fundamentals upon which May Day focuses attention are three elementary necessities: the nutrition of our children; the importance of an adequate clean and safe supply of milk; and the protection of motherhood.

We must develop a definite community procedure to ensure that every day in 1932 brings to every child at least the three bare essentials of milk, bread and some fruit or vegetable. We must be sure that every mother knows how to concentrate first on these essentials in the diet of her children and after that to supplement her menus in accordance with her means. The records of medicine and the sciences, including X-ray pictures, show beyond a doubt that if children lack essential body-building elements this year, these cannot be made up to them next year.

These essential foods must be safeguarded from contamination. This is especially true of milk. "Milk builds bone and muscle better than any other food." Yet unless it is made safe by adequate pasteurization, it may spread disease. Milk-borne epidemics, of typhoid fever, scarlet fever, septic sore throat and diphtheria, have not decreased during the past dozen years. They usually occur in small towns and rural districts which do not require adequate pasteurization of their milk supply. In these communities, then, for the protection of their children's health, families are working together to secure safe milk, meanwhile practising at home the simple measures that are necessary for safeguarding the milk they consume.

That the growing body of the child may utilize to the best advantage the food it gets, sunshine and relaxation are necessary. A measure of the joyfulness associated with May Day should be part of every day's health program. We should extend rather than curtail the development of parks and playgrounds, nature study, artcraft, and hobby clubs. Public-spirited men and women, in order to lessen the effects upon children of nervous tension in those around them, are encouraging groups like these, and are securing wise leaders.

May Day—National Child Health Day surely means that every child has a right to be well born of a healthy mother who will live to love her child and to take care of her family. This aim in a year when many mothers are enduring privations challenges us with one of the most vital problems of our times. What are our communities doing to provide prenatal, natal and postnatal care for every prospective mother?

Billboard and Sign Regulation in the Nation's Capital

By ROLAND M. BRENNAN
Chief Clerk, Engineer Department, District of Columbia

FOR over twenty years the erection of new billboards in Washington, D. C., has been prohibited. Nevertheless there has grown up in the national capital during this period an enormous number of signboards and wall signs which had to be officially winked at under the old billposting law, because they were alleged to advertise commodities sold on the premises.

In 1931 a bill was passed by Congress,* extending control over this situation to the District Commissioners, who appointed a committee of District officials to draft a set of regulations. After a public hearing these were put in final shape, adopted by the Commissioners, and promulgated on October 27, 1931, becoming effective 30 days later.

The outdoor advertising companies agreed to remove by February 1, 1932, all unauthorized signs as determined by a survey on the part of the Committee. They also agreed to remove all billboards and wall signs within residential zones and from sites opposite public buildings and parks within three years—40 per cent by December 1, 1932.

All authorized billboards, according to a new and authentic list, are marked with serial numbers on metal tags. Authorized wall signs are also assigned serial numbers.

Some of the outstanding features of the regulations are:

1. No sign as defined in the regulations, exceeding one square foot in area, may be erected, painted, re-painted, placed, re-placed, hung, re-hung, repaired or maintained without there first having issued therefor a permit from the Inspector of Buildings. An exception is made in the case of theaters changing the features of their bills and acts on established frames at the theater in question, or for changing the matter advertised on authorized billboards or wall signs.

2. Restriction of area of signs used to advertise products or commodities actually sold on the premises to 50 per cent of the total area of the sign.

3. Authority to compel the removal of signs which no longer advertise a business conducted upon the premises.

4. Forbidding the tacking, painting, pasting, or otherwise affixing of signs or posters of a miscellaneous character, visible from the public highways, on buildings, barns, sheds, trees, fences, etc.

5. Requiring that all applications for permits to erect commercial signs on buildings or land abutting public buildings or public parks be submitted to the Commission of Fine Arts before permit is issued.

6. Restricting the area of replacement signs in the case of non-conforming uses in residential zones to 40 square feet.

7. More stringent requirements on roof signs and prohibition of signs on spires, towers, domes, pent-houses, chimneys, smokestacks, water storage tanks and cooling towers above the limits of height as established by the zoning regulations.

8. Restricting signs on show windows to 20 per cent of the area of such windows.

9. Authorizing permits for not to exceed one sign on premises where building operations are under way, carrying the name and address of the architect, contractor and subcontractor.

10. Authorizing permits for signs on temporary enclosing fences where building operations are being conducted, limited to 40 square feet and restricted to the name and address of the business to be located on the premises so enclosed and identification of the adjoining business.

11. Limiting the total area of sign or signs on any one building, lot or parcel of land to 100 square feet, with the privilege of erecting signs of such area on each street frontage of a corner building.

12. Prohibiting signs from obstructing any window, door, fire escape, balcony or platform or ingress to or egress from any building.

13. Prohibiting the display of advertising signs on vacant business property except one sign not to exceed 6 square feet in area giving the name, business and new address of the former occupant, which sign may be displayed for not to exceed 60 days, and "For Rent" and "For Sale" signs.

14. Requiring that no existing sign shall be repaired, altered, repainted, or moved unless it be brought into compliance with the requirements of these regulations.

15. Providing that no new billboards may be erected unless application for permit be approved by the Commissioners, and that existing authorized billboards located in commercial and industrial areas may be repaired or rebuilt only when authorized by the Commissioners.

16. Requiring that persons engaging in the sign business shall publicly display at their place of business licenses issued by the Superintendent of Licenses, and that permits for signs shall be kept on premises where the sign is being erected.

17. Providing that no permit shall be required for a real estate sign not exceeding 6 square feet; restricting to 40 square feet real estate signs within residential zones and to 60 square feet real estate signs in the outlying and unsubdivided sections of the District of Columbia.

18. Providing for the identification of all commercial signs with permit number and date of permit.

Printed regulations in convenient pamphlet form containing a complete index have been widely distributed so that every policeman and building inspector, who is charged with the enforcement of the regulations, may be able to detect violations. It is also proposed to give instructions in the police school in the matter of enforcement of the sign regulations.

* See brief account in THE AMERICAN CITY, May, 1931, p. 144.

BILLBOARDS DISAPPEAR

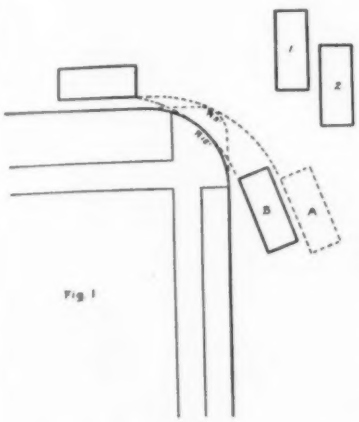
NEARLY 20 per cent, or 118, of the signboards on the famous Baltimore-Washington Pike, Highway No. 1, have been taken down within the past 12 months, according to a check-up just made by the American Civic Association. The count of a year ago, made during the Association's survey of the approaches to Washington, showed 603 signboards. The signs removed were not snipe signs, but actual boards standing on their own props. Only 154 large painted bulletins now stand along this stretch, 11 of them blank.

The Radii of Curbs at Intersections

A Report Submitted by a Committee of the City Officials' Division of the American Road Builders' Association

As in most problems involving the regulation and control of traffic, a discussion of curb radii at intersections should consider two distinct and often opposite points of view—that of the automobile driver and that of the pedestrian. Street improvement for the needs of vehicular traffic has progressed in most cities to the point where it is obvious that wide curb returns are not only advantageous but necessary for the smooth flow of vehicles. It is equally obvious that as the radius of the curb is increased, the speed of the vehicles making the turn increases with a resultant rise in hazard and inconvenience to the pedestrian.

Because of the numerous factors involved and the lack of reliable data, the actual increase in hazard to pedestrians in relation to curb radii is mostly speculative. It is well known, however, that a wide curb return in a heavily traveled business district seriously inconveniences pedestrian traffic in that it reduces the available sidewalk space. This disadvantage can be offset by cutting the corner of the building, which not only increases the space for pedestrians but materially improves the motorist's view across the intersection. As most heavily traveled intersections in business districts are under automatic signal control, the speed of vehicular traffic is such that the hazard to pedestrians occasioned by right turns can be disregarded, and, if provision is made for ample sidewalk space, the question of proper curb radii can be considered from the point of view of the automobile driver.



A DEMONSTRATION OF THE ADVANTAGE OF INCREASING THE CURB RADIUS ON A STREET CARRYING TWO LANES OF TRAFFIC IN EITHER DIRECTION

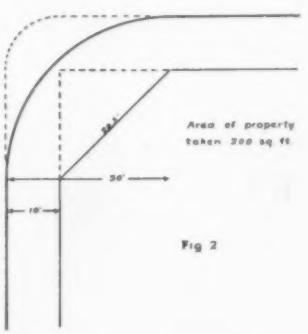
In general it may be stated that the proper curb radius is one that will at least allow the turning vehicle to proceed in its new direction without interrupting more than one moving lane of traffic. Where there are unusually wide streets, a turn can often be made around a short radius without interfering with oncoming traffic, but the turning vehicle is forced to measurably slacken its speed. Thus, although a turn can be made without delaying the main stream of traffic, the curve should be such that a vehicle can negotiate it at a reasonably rapid pace.

Most automobiles can turn on a radius of 25 feet or under. Assuming 25 feet as a standard, Figure 1 shows the advantage of increasing the curb returns on a street carrying two lanes of traffic in each direction. The dotted line indicates a curb of 5-foot radius. In turning this corner the car finds itself in position "A" and has interrupted the progress not only of car number 1, but of car number 2 as well. The same car turning the corner on a 15-foot radius is in position "B" after completing the turn, and has delayed only one lane of traffic, since it is not necessary for it to pass into the path of car number 2.

Wider Curb Return Desirable

As very few drivers utilize the full turning capacity of their cars, it is probable that on a street about 30 feet wide between curbs a wider curb return than 15 feet would be desirable. At intersections controlled by automatic traffic signals or four-way boulevard stop signs and where the free flow of vehicular traffic is essential, a curb radius of 30 feet is becoming standard in Los Angeles.

Figure 2 shows a corner with a radius of 30 feet and the corresponding cut-back of the building which formerly was flush with the property lines. Had the corner of the building not been cut back, the space left for pedestrian movement would have resulted in serious sidewalk congestion and inconvenience. Such a corner can either be cut back or arcaded. It is obvious from the sketch that this corner offers a much better visibility for approaching motorists. Where it is necessary to install a wider curb radius to allow room for the passage of automobiles between turning street cars and the curb, the building is usually cut back on three angles, as shown by the dotted lines in Figure 2. Wherever possible, curbs should be arranged to allow the free movement of automobiles between turning street cars and the sidewalk.



A CORNER WITH A 30-FOOT RADIUS AND A CORRESPONDING CUT-BACK OF THE BUILDING

In residential districts or areas where traffic is light, it is good practice to cut corners back on a radius equal to the width of the wider sidewalk and parking. This does not materially affect the sidewalk capacity and offers a safer and better accommodation to vehicles. Figure 3 illustrates the method of determining these radii geometrically.

At intersections of state or county highways a higher degree of safety and convenience may be obtained by laying out and paving between the roadway on a radius of 30 feet or more. As most highways are considerably less in width than city streets, the practice of providing a wide turning radius will eliminate the difficulty shown in Figure 1 and thereby greatly reduce accident hazards. It is of course very desirable to cut back banks or corners of buildings for the purpose of increasing the range of vision of the automobile driver.

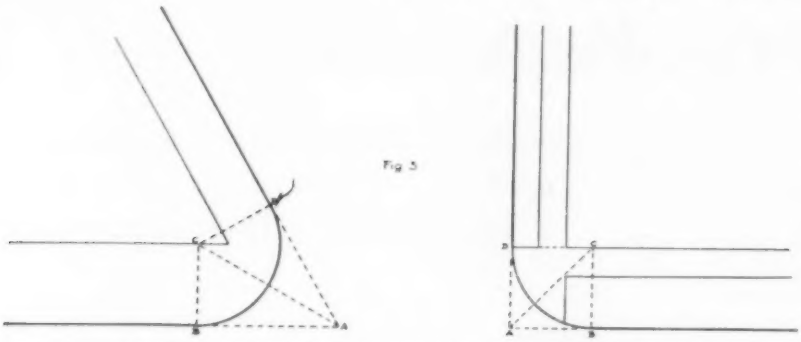


Fig. 5

A METHOD OF DETERMINING THE CURB RADII GEOMETRICALLY

Because of the varying factors in different localities, it is impossible to set down definite standards for the length of curb radii. Each intersection should be studied and a radius selected which will most nearly offer all the desired advantages.

EDITORIAL NOTE.—The Committee presenting this report consisted of: Chairman, M. O. Eldridge, Assistant Director of Traffic, District of Columbia, Washington, D. C.; J. W. A. Bollong, Traffic Engineer, Seattle; Wash.; H. C. Dickinson, U. S. Bureau of Standards, Washington, D. C.; Charles G. Ganter, Traffic Engineer, St. Louis, Mo.; Maxwell Halsey, Traffic Engineer, National Bureau of Casualty and Surety Underwriters, New York; E. B. Lefferts, Engineer, Public Service Department, Automobile Club of Southern California, Los Angeles, Calif.; Burton W. Marsh, Traffic Engineer, Philadelphia, Pa.; G. A. Schuldt, Residing Magistrate, Police Court, Washington, D. C.; Hawley S. Simpson, American Electric Railway Association, New York; Russell Wise, Chairman, New Jersey Traffic Commission, Trenton, N. J.

Los Angeles Starts Systematic Planting of Street Trees

By **L. GLENN HALL**
Chief, Division of Forestry,
Department of Parks,
Los Angeles, Calif.

TREE-LINED VISTA ON RESIDENTIAL STREET
Although this street in Los Angeles is practically all built-up with one-story houses of differing architecture, very few of them are visible in the picture. The trees are Arizona ash, planted about eight years ago

HOW can street tree planting best be done in American cities? Perhaps Los Angeles has found the answer in its program carried on under an allocation of $100,000 from a $1,000,000 bond issue voted for unemployment relief through park development work.

During a six-months period over 16,000 trees were planted on 80 miles of main thoroughfares in Los Angeles, in what is believed to be one of the largest programs of street beautification ever carried on in so short a period in any American city. The work gave employment to about 200 men working every other week and certified by an Employment Bureau operated by the City Fire Department. The planting program was in charge of the new Division of Forestry of the City Park Department. This Division was established in the fall of 1930 after a number of attempts had been made over a period of twenty years to have the city exercise the proper control over street planting. The ordinance establishing the Division provides that a permit must be obtained by any one desiring to plant, trim or remove a street tree, and gives the Division authority to designate the kind of trees and to specify their location and distance apart. Protective measures are also included, such as requiring a permit for the moving of houses where street trees are likely to be injured, prohibiting the pouring of salt, oil or other deleterious matter around trees, cutting, defacing, attaching wires, etc. All these points are covered in most of the municipal street tree ordinances throughout the country. But the Los Angeles ordinance also authorizes the Forestry Division to begin the preparation of a master tree plan of the entire city, which will, in effect, "zone" each street for appropriate types of trees. This plan is to be approved by the Board of Park Commissioners and the Board of Public Works, and adopted by the City Council as the official tree plan of the city.

All of this would be comparatively simple in a city of

50,000 to 100,000 people, but in a city of 1,250,000 with a widespread area of about 450 square miles, such as Los Angeles, it presents a complicated problem. There are over 5,000 miles of dedicated streets in Los Angeles, of which about 2,900 miles are classed as improved. Probably this does not convey an idea of the magnitude of the task as much as to point out that it is 40 miles from the southern to the northern boundary of the city and 25 miles from the eastern city limits to the Pacific Ocean on the west. The ordinance provides that the plan may be adopted in sections as fast as completed. Approximately 5,000 separate maps will be required, which are being made on standard size sheets. It is necessary to prepare new base maps and then plot information from field surveys of actual conditions, since all existing trees are to be located on the plan. Over 600 base maps have already been completed by utilizing the city's unemployment fund in giving work to unemployed draftsmen. It has been estimated that about five years will be required to map and survey the streets and trees for the main portion of Los Angeles, excluding the San Fernando Valley and San Pedro. The San Fernando Valley covers more than twice the area of the main portion of the city.

The Forestry Division, however, is not waiting for the completion of the master tree plan maps to put the plan into effect. Whenever permits are granted for planting new trees, an investigation is made of the particular block and an appropriate type of tree designated. Thus the uniform planting of street trees in Los Angeles is already assured.

Since the Division of Forestry was established, over 3,600 trees have been planted by citizens under permits from the Division. In addition to supervising the planting of trees, the Division has also rendered valuable service in giving advice on the care of trees, in causing trees to be trimmed or removed at corners where traffic vision is obscured, and in issuing notices to citizens to have trees trimmed that overhang the street or sidewalk in a dangerous manner, and has saved many trees from being hastily and unnecessarily removed.

Street Engineering and Forestry Cooperate

All plans prepared by the Bureau of Engineering for street improvements involving existing trees, or future tree locations, are now referred to the Forestry Division for approval. A considerable number of trees have already been saved in street widenings by re-setting or re-planting them with new trees. Excellent cooperation has been received from the Bureau of Engineering in this work. A recent example of the value of coordination between these two municipal departments is seen in the opening and widening of South Flower Street, a future business artery about fifteen blocks long, from Washington Street to Figueroa Street at Exposition Park.

By having the Division of Forestry check over the plans and also inspect existing trees on condemned street property, the proper openings for trees were left in the concrete sidewalks, equally spaced between electrolier locations. A credit for the salvage of existing trees was obtained and applied on the purchase of 245 Washington fan palms. Thus, as soon as the paving was completed, and even before the installation of electroliers, the entire new section of street was lined with large-size palms from five to six feet high.

STATELY PINES LINE LOS ANGELES STREETS
Canary Island Pines on this street in the Hollywood section of Los Angeles show how uniform tree planting enhances the appearance of a street

In addition to tree planting with the allocation of $100,000 from unemployment relief bonds, we also trimmed and pruned existing trees on 65 miles of streets.

The Division of Forestry is to maintain the trees planted on twenty-eight major boulevards for five years under regular budget funds. Property owners are paying for the maintenance of trees on twenty secondary thoroughfares at the rate of $1 per tree per year. This is a purely voluntary arrangement between the property owners and the Forestry Division, and has no connection with assessments or taxes. The maintenance work is billed to property owners in advance on January 1 of each year.

That a city of the size of Los Angeles should be able to institute a system of municipal control of street trees and to actually plant over fifty of its main thoroughfares within one year, should be an encouragement to many other cities that have not yet solved this problem.

Construction Costs Have Decreased More Than Money Costs Have Increased

THAT municipalities have much more to gain from present low construction prices than they are losing because of prevailing high interest rates on bonds for public improvements, is pointed out in a recent statement of the Portland Cement Association. Although in St. Louis County, Missouri, for example, $1,500,000 worth of bonds were sold for $27,750 below par, according to the County Engineer the money received from the bond sale will still build more concrete pavement than was planned when the bond issue program was adopted. Indeed, the statement continues: "The lessened return from the bond sale is but a drop in the bucket as related to the dollar's greater purchasing power. The bonds were sold in that case at a discount of 1½ per cent, whereas the dollars obtained will buy 60 per cent more than formerly." This theme is presented more fully on page 58.

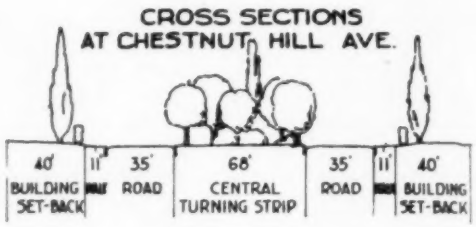
Brookline Plans Steadyflow Highways

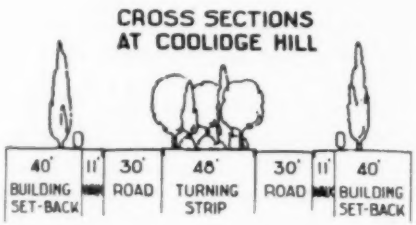
By **ROBERT WHITTEN**
City Planning Consultant, New York

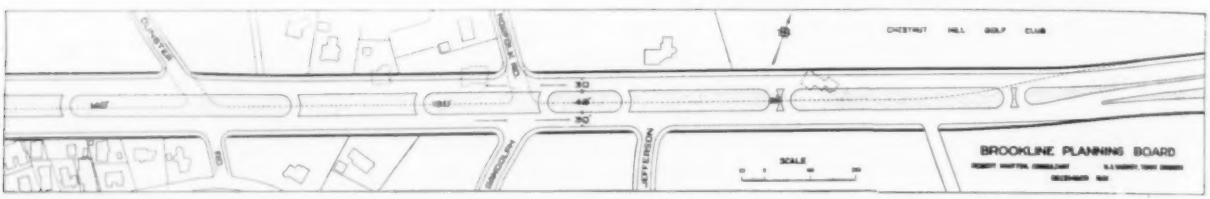
THE town of Brookline, Mass., is located athwart important main lines of radial and circumferential traffic in the Boston metropolitan region. As Brookline is primarily residential in character, it would, if possible, like to have all through traffic by-passed around its borders. This, however, is impractical. Boylston Street in Brookline has been selected by the State Highway Department as the terminus of the Boston-Worcester Expressway, now approaching completion. This highway is to have double roadways and grade separations at most of the important intersecting highways.

The Brookline Planning Board has undertaken to cooperate with the engineers of the State Highway Department in developing plans for the new highway with a view to safeguarding the interest of the town as well as providing adequately for the expected through traffic.

The proposed plan for the new highway attempts to take advantage of the best thought and practice in highway design for the motor age. It would provide safety, moderate speed and continuity for through traffic while at the same time preventing so far as feasible the blighting of adjacent residential areas. The noise incident to heavy traffic is a chief cause of injury to residential property. Under the plan proposed, double roadways, depressed roadways, and grade separations will greatly reduce the noise nuisance. The wide right-of-way with broad planting strips for shrubs and trees will diffuse, deaden, or absorb much of the noise. The sunken central roadways with sodded and planted earth embankments, proposed for two short sections of the highway, should be particularly effective in blanketing the sound waves.

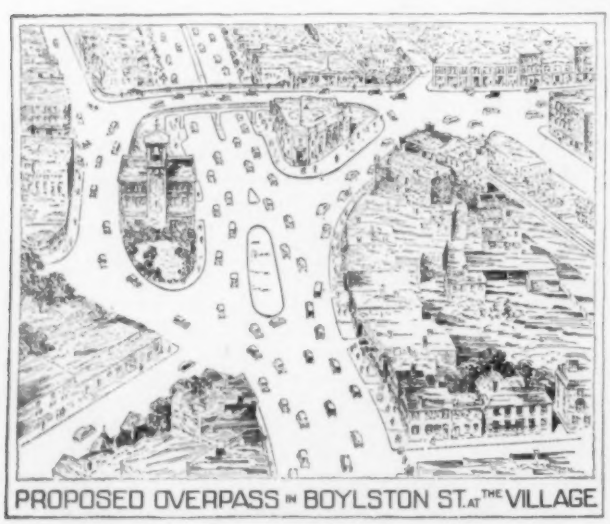






STEADYFLOW TRAFFIC PLANS FOR BROOKLINE

As alternatives to the more expensive projects for depressed roadways, these steadyflow plans for Coolidge Hill (above) and Chestnut Hill Avenue (right) are proposed



DESIGNED CHIEFLY BY FREDERICK LAW OLMSTED

The plan proposes grade separations at three important intersections. At other cross streets continuity of traffic flow is to be secured by double roadways separated by a wide central island. Cross traffic will first turn right and then make a U turn around the central island. This is the so-called steadyflow system, of which Fitz Malcher is the chief developer and exponent. For the steadyflow system a minimum width of about 120 feet is required, divided between two 10-foot sidewalks, two 30-foot roadways and a 40-foot central island.

It was found that in the case of Boylston Street a minimum widening to about 90 feet would require the destruction of all the trees on one side of the street, whereas with the proposed widening to 120 feet the trees would be included in the central reservation and thus preserved.

It is estimated that the new highway will have an average daily traffic of about 15,000 vehicles and that this traffic will increase by about 40 per cent within the next 25 years.

Philadelphia Regional Plan Formally Presented

A DEVELOPMENT plan for eleven counties of Pennsylvania, New Jersey and Delaware, covering an area of over 4,000 square miles, and involving some 400 political subdivisions, was formally presented to the public on March 16, at a dinner held in the Bellevue-Stratford Hotel, Philadelphia, by the Regional Planning Federation of the Philadelphia Tri-State District.

This great undertaking, next in magnitude to the Regional Plan of New York and Its Environs, is the outcome of a movement started less than ten years ago, which resulted in raising from the citizens and business organizations of the region in 1928 $600,000 to cover the cost of surveys and studies and of a comprehensive plan. So remarkable was the cooperation secured throughout the region that William H. Connell, Executive Director of the Federation, in his address at the dinner, stated that he knew of no other instance in the technical field where "through cooperative effort, a group representing several hundred persons, necessarily with diversified interests, through discussions at hundreds of meetings over a period of three years, have arrived at a harmonious judgment in the formulation of such a comprehensive plan."

Looking Upstream and Down

The interdependence of the vast area covered by these studies was emphasized by the Federation's President, Colonel Samuel P. Wetherill, Jr.:

"The disposition to look upstream for an unpolluted source of water supply whose purity shall be guarded by the self-denial and character of those who reside upstream, and to look downstream and see only a waste carrier whose function it is to dispose of waste for which we have no use—this disposition is out of keeping with the interdependence of the several communities which go to make up the region as a whole, in which our prosperity, health and happiness are at stake.

"I think it is safe to say that not one single aspect of this great program of mutual development of our common terrain is independent of the elements of citizenship, consideration for each other and the spirit of subordinating the narrower to the broader interest."

For the More Abundant Life

Planning for the profitable use of leisure time was urged by Thomas S. Gates, President of the University of Pennsylvania:

"It is not only because of the growth of population that we shall need planning more than ever in the future. I am convinced that we need it also because of a changing economic condition. We have been for three years in the midst of a world-wide business depression. There have been many guesses as to what will be found as the solution of the condition brought about by reason of the fact that we can produce more commodities than we can consume in the same period. Whatever ultimate technical solutions may prove effective, I believe that one thing that will come about will be a shortening of the hours of labor and therefore an increase of the hours of leisure, and thus a greater devotion of time, both professionally and avocationally, to matters of recreation, esthetics, and the profitable use of leisure time. In these matters, regional planning will be of the utmost importance. On the one hand, the carrying-out of the recommendations of such a plan will give work to an increasing number of persons; and, on the other, the results of such planning will assist in the wholesome and profitable use of time."

Saving Waste by Spending Wisely

The taxpayer's interest in regional planning was stressed by Clinton L. Bardo, President of the New Jersey Taxpayers Association:

"I believe regional planning is fundamental to the orderly arrangement and proper growth of all the major physical facilities necessary to the best interests of the social and economic life of our people living in interdependent communities. Some individuals see in the proposal merely another plan to add to the taxes which already oppress us. On the contrary, regional planning will be a money-saver and a money-maker for the taxpayer. It may be expected that certain local politicians, fearful of losing some of their own powers and patronage, will object to the citizens' deciding for themselves whether or not they want the benefits of the larger-scale improvements, growth, development, economy and efficiency which regional planning will make possible. And so the taxpayer everywhere must become interested as never before.

A 54-page digest of the policies, principles, procedure and findings of the Regional Planning Federation of the Philadelphia Tri-State District, is available to planning agencies on application to the Federation's office, 1420 Walnut Street. The final report itself is expected to be ready for distribution within a few weeks, at a cost of about $7.50.

National Committee on Street Maintenance Economics

REPRESENTATIVES of nine national organizations of public works officials and research agencies have formed the National Committee on Street Maintenance Economics, which will provide street maintenance engineers with the various records, accounting and other administrative devices which must supplement a good organization and technical ability if effective street maintenance is to result. The work of this Committee is financed jointly by the International City Managers' Association and the American Road Builders' Association. One of the first activities of the Committee will be the design of a record and cost system to aid city officials in determining when streets should be repaved. There is a period in the life of any paved street when the costs of maintenance exceed the spread cost of reconstruction. A few cities already keep such records for determining their street maintenance programs, and the Committee will endeavor to standardize these practices so that they may be applicable to the street maintenance in cities of any size or form of government.

The Committee is as follows: Chairman, George B. Sowers, former Commissioner of Engineering and Construction, of Cleveland, Ohio, representing the American Road Builders' Association; C. C. Ludwig, Albert Lea, Minn., representing the International City Managers' Association; Colonel H. M. Waite, Cincinnati, Ohio, representing the National Committee on Municipal Standards; J. E. Root, Cincinnati, Ohio, representing the American Society of Civil Engineers; P. L. Brockway, City Engineer, Wichita, Kans., representing the American Society of Municipal Engineers; Robert B. Brooks, Director of Public Works, St. Louis, Mo., representing the International Association of Public Works Officials; Carl H. Chatters, Detroit, Mich., representing the International Association of Comptrollers and Accounting Officers; William J. Locke, San Francisco, Calif., representing the American Municipal Association; and Robert M. Goodrich, Duluth, Minn., representing the Governmental Research Association.

Reducing Automobile Accidents by Municipal Control of Operators

Practical Preventive Methods for Discovering and Handling Accident-Repeaters

By BURTON M. PARKS

EVERY city and town can exercise extensive control over the amount of damage and injuries caused by accidents within its limits. This can be done to much greater extent than has ordinarily been considered possible, although many praiseworthy efforts have already been directed to that end.

How has this problem usually been attacked? First, by educative work in the schools, by newspaper publicity, and by the use of safety posters; then, in some cities, all accidents are thoroughly investigated and drivers found at fault are brought to court and punished for their improper operation. Do these two methods exhaust the possibilities? No, for it seems that they do not really get to the core of the whole problem. There is a third way, which has as its essential principle, not mass education, nor punishment, but *prevention.*

Under the direction of Dr. Charles S. Slocombe, Safety Advisor to the Registry of Motor Vehicles in Massachusetts, careful studies made over a long period of time have conclusively shown that an astonishingly small percentage of all drivers are actually responsible for most accidents. A five years' accident record of 5,000 motorists, the results of which are now available,* showed that 62 per cent of the drivers had no accidents at all, and that 58 per cent of the accidents could be directly traced to 14 per cent of the operators. Then it may be said that roughly 85 per cent of automobilists consistently drive in a safe and sane manner, and that the other 15 per cent are repeatedly in trouble owing to their violations of the laws and their frequent accidents.

It naturally follows that any successful drive for accident prevention ought to be launched, not against the entire driving population, but against this dangerous minority. This finding is new; it is basic, and should henceforth be the focal point of all intelligently designed accident prevention programs. It is this small percentage, these men who have definitely shown themselves to be the major cause of the trouble, who must be controlled. They are the ones who have shown themselves by their continuous records to be almost oblivious to all previous efforts directed by the authorities toward safety.

This is all very well, one may argue, but how is it possible to pick these drivers out from the large number on the streets and highways? The idea is excellent, but at first sight it seems no more practical than that of the mouse that suggested some ally tie a bell around the cat's neck. It is not, however, really so difficult. Indeed, it has been done in two Massachusetts cities.

The police work in Cambridge and Somerville, two cities adjacent to Boston, has been directed to this end—that is, learning how, when, and where to watch the destroyer *about* to act, and how to prevent his anticipated action. In short, police activity has been directed toward the supervision, control, and discipline of the menacing minority.

The unsafe driver should be corrected before he does the damage. It is folly to wait for him to kill or injure and then to punish him. The following is a true incident. At a meeting of the Chamber of Commerce in a certain city, the Secretary commented on the surprising fact that many accidents happened just where traffic officers were stationed. One rather critical member hit upon the true reason. The officers in question, he said, would stand idly by and watch two automobilists speeding to a collision. After the collision, they would calmly walk up and take names and addresses, with a view to having the offenders brought into court.

Danger Spots and Accident Repeaters

In every city there are accident spots—certain streets, intersections, and places where accidents occur frequently. Inadequate lighting, heavy traffic, obscured vision, some peculiarity in the physical layout or other condition, contributes to making these spots more difficult for operation than other places. Perhaps some of these difficult places could be suitably changed or modified so that operation is easier; but until these sometimes costly changes are made, automobilists must be required to operate appropriately.

Who have the accidents at these spots? Not the good drivers, but those who are incapable of good operation or who are unwilling to use judgment. These bad places are test situations which throw the spotlight on the repeater, the accident-prone man, the killer—however the man in the menacing minority may be designated. He is found at these places, speeding, failing to judge speed and distance correctly, failing to consider the aged, forcing his way into a tangle of traffic—in other words, behaving in his own characteristic bad manner. It is perhaps a little easier now to understand where, when, and how one expects to pick up the repeaters.

One of the interesting facts that Dr. Slocombe found in his studies of repeaters is that very frequently they have accidents with each other. A good driver can often avoid an accident with an incompetent or reckless operator; but when two of the latter meet, an accident is almost certain to take place. This generally happens at the accident spots mentioned above.

Methods Adopted in Somerville and Cambridge

In Somerville and Cambridge now, all police officers are instructed to report every accident which comes to their attention, and to insist at the same time that each operator appear in person at the station to make a report. This applies to accidents involving personal injury, or

* The mimeographed report on which this article is based can be obtained on application to the Commission for Public Works, State House, Boston, Mass.

property damage in excess of $25. This practice is of course followed in many cities. In such a way the authorities obtain information as to what is taking place. In these cities there are now very few accidents of any consequence which fail to come to the attention of the police. In the police stations accident location sheets are kept. On the left side of these sheets appear the names of the main streets of the city or police precinct. The sheets are ruled in thirty-one columns for daily entry. Thus a daily record of accidents by location, time, and type is easily kept. It has been found from experience in ten cities and police precincts that rarely are there more than a dozen streets or locations in one precinct that are important from an accident standpoint.

After it has been found from a location sheet that, say, ten or twelve accidents have taken place on a particular street, what is the next procedure? The nature of the accidents is carefully studied to see in what way they appear to be similar, and what form of improper operation has caused them to happen there. The officer in charge of the work then observes at first hand the habits of automobile operators driving on that street at the time when accidents are most frequent. From the study of the accident reports and the facts gained from observations, a decision is made as to just what is wrong with the operation on that particular street. For example, on one street it was found that the operators were speeding by certain intersections too fast, not discriminating between those which they might safely pass at an average speed and those which should be approached with caution; at another street it was found that the accidents were caused by people cutting out of line and passing to the left of the center of the road. Many accidents were taking place at a corner where automobiles were coming out at the wrong time from a side street into a main artery. On another street automobiles were parking within twenty feet of corners, thereby blocking the view of passing motorists. On this street many pedestrian accidents were taking place.

These accident spots and streets having been studied, the next step was to arrange to have suitable young and active traffic officers from nearby posts (in quiet hours) and patrolmen on route duty informed of the types of operation they should not permit at certain locations. These men are then detailed to supervise automobile operation at those places at appropriate times. A man need not be stationed at such a place all the time, for one man can often supervise four such spots, staggering his hours so that the motorist never knows where the officer is going to be, but remembering that the officer is active all the time.

It has been found that police officers become interested in this work when they can actually see the results of their efforts by means of the records kept. It is very difficult to maintain a sustained activity when there is no means of knowing the results of that activity. But when an officer covering a particular street can see month by month the improvement in the record of that street, he has an incentive that is very strong. In both Cambridge and Somerville, bad streets assigned to the supervision of capable officers have been absolutely cleared of accidents.

Educating and Restraining the Dangerous Minority

It is the repeater that these officers deal with mainly. The 85 per cent, the good drivers, seldom require any attention. They pass by, operating properly, secure in the knowledge that they are not going to be bothered. Although the officers have the sanction of the law, a great deal of their work is really instructing as well as warning violators. Such supervision, moreover, gives a check on specific improper operation. This is in contrast with general statements that a man is traveling too fast, going by an intersection without using due care, or passing to the left of the center of the street. Such statements generalize the faults of operation. At the right place and at the right time, it might be perfectly safe for a driver to pass an intersection without slowing down. The incapable operator is the one who cannot judge when and where.

The offenders at these accident spots may or may not be brought into court. A record of warnings is, however, kept at the stations, together with a record of those who have accidents. Thus it is often found that the man who has been warned, perhaps fined, is the man who becomes involved in accidents. Such cases rightly receive severe punishment, either by fine or through the revocation of license by the Registrar of Motor Vehicles.

How the State Should Help

It was said in the beginning that to a large extent, but not entirely, a city or town by its own efforts controls the actions of automobile drivers so that they drive safely when within the city limits. But outsiders also contribute to the accidents in every city. Detailed studies of this have been made in Massachusetts. It was found that, on the average, local residents only are involved in 43 per cent of the total accidents, local residents in collision with outside operators are involved in 17 per cent, and outside operators only are involved in 40 per cent. While it is not possible to keep a man from driving into any city, it *is* possible by the means outlined herein to make him behave. But to do this completely it is necessary to have some plan by which the records of improper operation of a man who is constantly driving from place to place may be gathered together. A man, for instance, was checked in Somerville, drove into Arlington, where he was checked again for a similar violation, then proceeded to Lawrence, there having an accident. If such a man's behavior is to be properly judged, all these records must be brought together. To this extent any city that seeks complete control of the motor vehicles within its limits should work in cooperation with a state agency such as the Registry of Motor Vehicles, where the facts are centralized.

Safeguarding Congested Traffic

The traffic problem in Somerville is especially acute. Somerville is one of the most congested cities of its size in the United States. More than a hundred thousand people are packed into its 4.22 square miles. This city has without doubt the busiest main thoroughfare in New England. The heaviest traffic is at the intersection of Mystic Avenue and the Northern Artery, where a tabulation showed 64,000 cars passing through from 7:00 a.m. to 11:00 p.m. Dr. Slocombe's system has certainly received an acid test here. In July, 1930, there were 106 accidents at intersections in Somerville. During July, 1931, after this plan had been introduced, the figure was reduced to 35. During the first four months of its inception, no fatalities took place in Somerville. During July-February, 1930, there were 1,012 accidents in that city, whereas, in the corresponding eight months in 1931 the total was 759.

The Chiefs of the Police Department in both Cambridge and Somerville have said that this system shall be the permanent policy of their departments. Their men have always used considerable effort directed toward safety, but as there never before has been such a specific purpose or carefully defined plan in their work, much of this excellent effort has previously been wasted. So convincing, in fact, has been the success of the plan and organization in these two cities that arrangements have already been made to extend the system to seven other Massachusetts cities, and more recently into Boston itself.

The progress of the work has shown clearly that three essential factors must be present in any city which wants such results. There must be a keen interest on the part of the mayor and the city authorities. The chief of police must have a like interest. The chief must, moreover, maintain this interest and constantly keep in touch with all that is taking place. His interest, in other words, must show itself at all times so that his men may constantly follow his leadership. With all the responsibilities which a chief has, this added responsibility is not to be lightly undertaken. Also, the police department must be so organized that the work can find a place without disrupting existing organization and without loading too heavily any division of the department. The question of expense does not enter into the problem, for where organization is appropriate no expense is incurred.

The studies here outlined show that accidents are not inconsequential events. They happen, not to every one, but to certain people at certain places. Viewed from this standpoint, automobile accidents appear by no means incapable of control or prevention. Not every city may be so organized that it can undertake this program in its entirety; but if each and every city will organize as much as possible along the lines described in this article, there can be no question that the present yearly toll of dead and injured will no longer be written into the history of America.

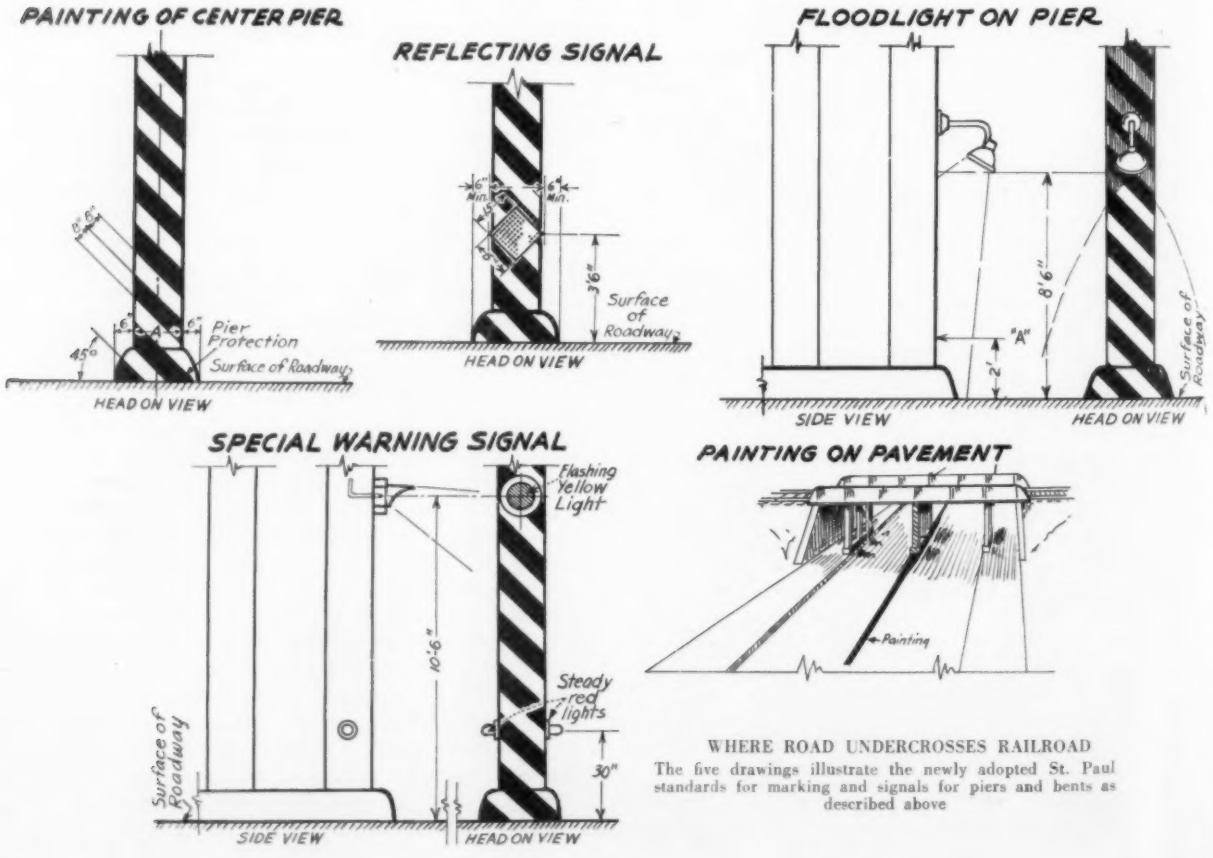
TRAFFIC CONTROL AND FACILITATION

Conducted by the Institute of Traffic Engineers, 175 Fifth Avenue, New York

Publications Committee: Maxwell Halsey, Chairman, Hawley S. Simpson, Harry H. Hemmings, Arthur G. Straetz, P. J. Stupka

New Markings and Signals Standards in St. Paul

ACCORDING to George Herrold, City Planning Engineer, St. Paul has adopted a standard method of markings and signals for piers and bents in the roadway. These will have application at the bridge piers at undercrossings where railroad tracks have been carried over streets. The standards were submitted by the Committee on Traffic, of the City Planning Board, were adopted by the City Council on February 2, 1932, and were approved by the Commissioner of



WHERE ROAD UNDERCROSSES RAILROAD

The five drawings illustrate the newly adopted St. Paul standards for marking and signals for piers and bents as described above

Public Safety.

The standards adopted, as shown in the accompanying illustration, are as follows:

Painting of Center Pier.—Alternate black and yellow stripes, 8 inches wide, sloping at an angle of 45 degrees downward, from left to right. Width of face toward approaching traffic to be at least 18 inches when pier is located in a vehicular way. When pier is located between street-car tracks, it should be as wide as possible without interfering with street cars.

Reflecting Signal.—The signal should have a clear and distinct outline at 500 feet when illuminated with standard 21-candlepower headlight bulbs adjusted according to state regulations, with the beam directed toward the signal. There should be 80 or more lens-buttons so installed as to be non-removable from the front. Their angle of reflection should be through a 90 degree arc. They should be crystal in color and should be set in a yellow pane in the shape of a square set on one corner.

Floodlight on Pier.—The diameter, reflector and lamp should be so designed as to render a uniform floodlight over the face of the area to be illuminated with an intensity of 3 foot-candles at point A (see Figure C) measured normal to surface.

Special Warning Signal.—A yellow lens with not less than 8 inches visible diameter should be used. It should be illuminated with not less than a 60-watt bulb and should flash 30 to 35 times per minute; 60-watt bulbs should be used for the steady red lights which are for night operation. The flashing light should operate 24 hours a day. The lens, reflector and visor should be so designed as to render the light plainly visible for a distance of 300 feet under ordinary conditions. This signal is to be used for special cases in high-speed roadways where more protection than is provided by a reflecting signal and floodlight is required.

Painting on Pavement.—The painting on either side of the pier separating vehicular traffic ways is to be used only where there is permanent or asphaltic carpet coat paving. On one-course concrete a black 6-inch band should be used, and on asphaltic and brick surfaces a 6-inch yellow band should be used.

Los Angeles' Highway By-Pass Tunnels

TRAFFIC on North Broadway, Los Angeles, Calif., became so heavy during the last few years that relief for this condition was imperative. Frequently as much as ten minutes was lost by the motorist in traveling only a few blocks. To avoid the congestion, the city laid out and built a by-pass route paralleling North Broadway through Elysian Park. The new route will ultimately be an extension of Figueroa Street, destined to be a principal thoroughfare of the city. While no distance is saved, the drive through Elysian Park is over 40-foot roads and permits rapid travel without interruption occasioned by cross-streets.

Elysian Park is quite hilly, and the new route necessitated the construction of three highway tunnels: one 461 feet long; another 130 feet; and, the third 405 feet in length. The two longer tunnels were drilled through the hills, while the shorter one was built by the open-cut method, the ground being replaced to its original contour after construction was completed.

The project, opened to traffic in the fall of 1931, permits autos from downtown to leave North Broadway at Solano Avenue, the point where they formerly began to slow down, and proceed without delay over the new 40-foot route through the tunnels, across the river to the outlying sections.

The portals of these tunnels, made of concrete, are usually attractive. Their design was approved by the Municipal Art Commission. The pleasing lines, the effective use of paneling and the details of the portals all add interest to the structure with but slight additional cost. The value of careful form work in exposed concrete jobs is exemplified in this tunnel work. The forms provided all details with sharp edges.

THE LOS ANGELES BY-PASS TUNNEL

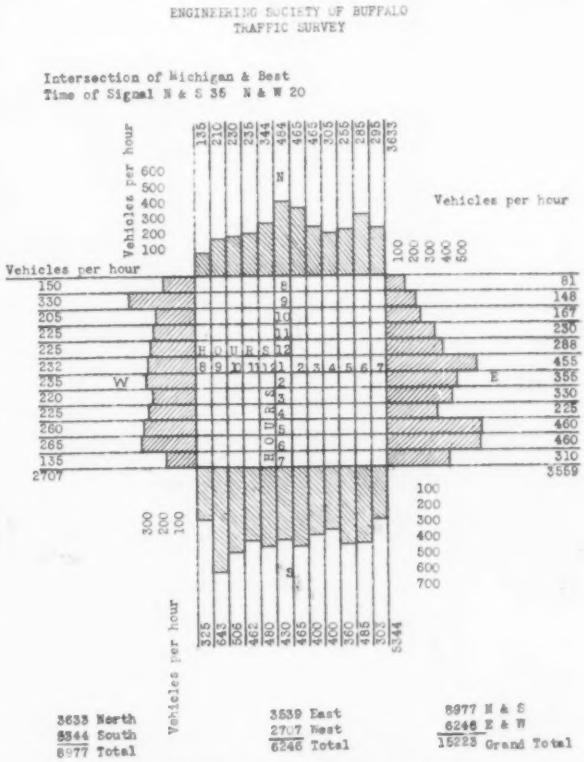
Buffalo Traffic Survey

A TRAFFIC survey of Buffalo has recently been completed. It was conducted by a special committee of the Engineering Society of Buffalo with the cooperation of nearly 3,000 members of the Boy Scout organization.

On a Saturday a count was made of the traffic entering the city on the principal arteries, of all traffic entering the downtown business area, and of the curb parking in the business district; also a volume study of many intersections where traffic lights have been installed.

Some of the most interesting facts were as follows. Out of 3,781 parked cars tabulated in one study, 1,863, or 49 per cent, were parked illegally, of which 32 per cent parked overtime, and 17 per cent were parked improperly or in prohibited areas such as near hydrants, at crosswalks, etc. At 10:00 A.M. a study of the off-street parking places, with a capacity of 15,820 cars, showed that only 56 per cent of the capacity was used. A second study, in the theater district at 9:00 P.M., showed that only 44 per cent of the capacity was used. The legal parking capacity of the streets covered by the one-hour parking regulations was 3,000. The total number of cars found parked both off-curb and at curb at 10:00 A.M. was only 12,651. Thus the off-street stations could take care of all the cars and still use only 80 per cent of their capacity.

The survey recommended that eleven signals be removed, three of them to be replaced by four-way stop signs, and eight of them by two-way stop signs; that thirteen signals be changed to manual operation and used only when needed, and that the timing of fourteen signals be changed. A Director of Traffic was recommended, "to secure the enforcement of the plan, including traffic regulations."



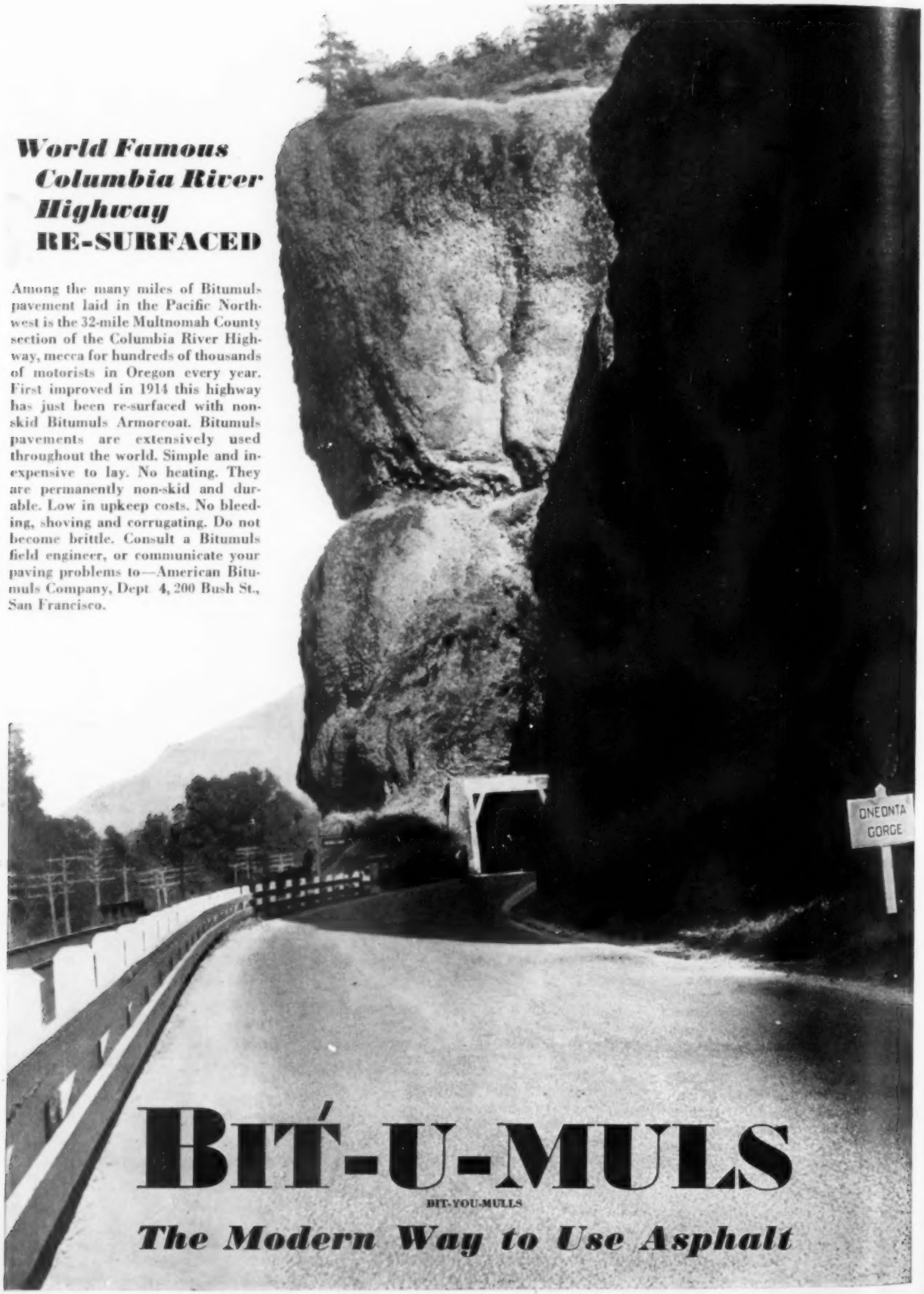
This record of traffic at a traffic light intersection point in Buffalo is one of the complete set of 160 such drawings

Federal Government Institutes Inquiry Into Traffic Accidents

SECRETARY OF COMMERCE ROBERT P. LAMONT, General Chairman of the National Conference on Street and Highway Safety, has recently announced plans for an extensive program of research by Federal Government agen-

World Famous Columbia River Highway RE-SURFACED

Among the many miles of Bitumuls pavement laid in the Pacific Northwest is the 32-mile Multnomah County section of the Columbia River Highway, mecca for hundreds of thousands of motorists in Oregon every year. First improved in 1914 this highway has just been re-surfaced with non-skid Bitumuls Armorcoat. Bitumuls pavements are extensively used throughout the world. Simple and inexpensive to lay. No heating. They are permanently non-skid and durable. Low in upkeep costs. No bleeding, shoving and corrugating. Do not become brittle. Consult a Bitumuls field engineer, or communicate your paving problems to—American Bitumuls Company, Dept 4, 200 Bush St., San Francisco.



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cies to determine the causes of automobile accidents and congestion and to develop remedial measures which may be applied by states and municipalities.

The Bureau of Public Roads will carry on the principal research work. Other government agencies, particularly the Bureau of Standards of the Department of Commerce, will cooperate in special investigations.

The program has been formulated in line with a resolution presented by the Editor of THE AMERICAN CITY and adopted by the National Conference which stated that lack of authoritative and comprehensive data on many phases of the traffic problem had seriously limited the work of the Conference.

The national associations participating in this Conference have assured the Federal authorities of their continued cooperation. Members of the Institute of Traffic Engineers are also cooperating in the preparation of a suggested program for the projected traffic research.

In his announcement of plans, Secretary Lamont states:

"It is not contemplated that the Federal Government research work will supplant that of existing bodies or that it will assume direction or responsibility for traffic regulation activities throughout the country. Its purpose is to develop needed information and make it available to states, municipalities, and the general public."

Joint Committee to Revise Codes on Signs, Signals and Pavement Markings

THE appointment of a joint committee of the National Conference on Street and Highway Safety and of the Association of State Highway Officials, to combine and make any desirable revision in the manuals on signs, signals and pavement markings, has also been announced by Secretary Lamont. The two existing codes have relatively small differences, but neither one covers all the material contained in the other. The formulation of a single code should be of great assistance in bringing about uniformity.

The Committee as appointed by Secretary Lamont and by Frederic E. Everett, President of the American Association of State Highway Officials, is as follows:

Representatives of American Association of State Highway Officials.—E. W. James, Washington, D. C.; W. F. Rosenwald, St. Paul, Minn.; H. E. Neal, Columbus, Ohio; C. P. Taylor, Boston, Mass.; J. S. Beakey, Portland, Ore.; R. H. Vey, Trenton, N. J.; T. H. Dennis, Sacramento, Calif.

Representatives of National Conference on Street and Highway Safety.—W. B. Powell, Buffalo, N. Y.; Maxwell Halsey, New York, N. Y.; A. H. Rudd, Philadelphia, Pa.; A. J. Montgomery, Washington, D. C.; Burton W. Marsh, Philadelphia, Pa.; C. W. Stark, Washington, D. C.; S. J. Williams, Chicago, Ill.; W. Graham Cole, New York, N. Y.

Economics of Traffic Signals

A STUDY of the cost of traffic delays at three signalized intersections in Akron, Ohio, is reported by E. A. Kemmler, Advisory Engineer of that city, as having recently been made by the local Department of City Planning. The following is the statement of H. G. Eckhardt, working under the direction of C. F. Fisher, Planning Engineer:

"To determine the relative time losses and their consquent costs, a check survey was made at three intersections controlled by different types of signal lights.

"The first was a light operated on a pre-timed basis and acting independently of any other light or series of lights. The second was a signal operating in a coordinated system on one street and independently on the other. The third was a light actuated by an impulse detector set in the surface of each of the intersection streets.

"An observer on each street entering the intersection clocked and counted the delayed cars caused only by the showing of the red signal. Such observations were not carried on throughout a normal 12-hour day, but were taken at the normal peak hours morning and evening and during a normal low-ebb period in mid-afternoon. To then arrive at approximate totals for a 12-hour period, an adjustment was made for the hourly fluctuation based upon a previous volume check.

"To merely set down the total number of vehicles passing through the intersection and the total number of seconds delay and from that to state that so many seconds delay occurred for each vehicle is insufficient, and a distorted result will follow. But by making individual adjustments for each interval of delay, allowance is made for the relative position of the cars in the line awaiting the "Go" signal. This is accomplished by the use of the formula:

$$Vm = \frac{N + 1}{2} \times \frac{S}{60}$$

Where Vm is vehicle-minutes delays;
N is number of vehicles in waiting line;
S is number of seconds interval of red signal.

"It is herein assumed that the average value of time in the operation of a non-commercial vehicle is approximately 1.0 cents per vehicle-minute, and of a commercial vehicle, 2.2 cents per vehicle-minute. It also has been observed that approximately 75 per cent of the vehicle-minutes lost are for the non-commercial type, and 25 per cent for the commercial.

"The table below records the findings computed from the field observation.

"The figures in the last column indicate that the saving of the traffic-actuated control over pre-timed independent control is $12.22 per day, or $4,460.30 per year. If this amount is capitalized at 12 per cent, it appears that this traffic signal, when operated by vehicle control, is worth $37,170 to the car owners who use this intersection."

Type of Signal	No. Vehicles Through Intersection	Vehicle-Min. Lost	Loss per Car	Cost of Vehicle-Min. Loss per 12-Hr. Day: Commercial-	Non-Com	Total
1. Pre-timed independent	13,600	1,994	8.94"	$10.98	$14.96	$25.94
2. Pre-timed coordinated	17,000	1,493	5.27"	8.20	11.20	19.40
3. Traffic-actuated	15,800	1,056	4.59"	5.80	7.92	13.72

A PRIZE-WINNING POLICE MAGAZINE CARTOON

Depicting, Among Other Things, the Geniality and Sympathy of the Patrolman

Spring 3100, the New York City Police Department magazine, always rich in contributions from men of art and letters who are also wearers of uniforms, presents as its prize-winning cartoon in a recent issue the predicament of the unwitting traffic violator. Abe Nelson, a policeman for 20 years, now engaged in painting stanchions in a repair shop, is the winner of the $2 prize

Resurfacing A State Highway With Brick

Resurfacing with brick salvages the old pavement . . . leaves subgrade undisturbed . . . gives lowest upkeep and longest life of any material . . .

SOMETHING *has* to be done with a road when weathering action and traffic wear boost upkeep costs and interfere with travel.

When this happens the practical thing to do is resurface with brick.

An old pavement makes a good base. Underneath it is a settled subgrade that, undisturbed, is a valuable asset. With a minimum of cost the old pavement is prepared for the brick surface and then you have the finest road in the world.

Brick is undisputed as the pavement with the lowest maintenance. For length of service, no other pavement comes near it. A vitrified brick surface resists damage from weather as well as traffic. It preserves the base and allows it to perform its structural function.

The National Paving Brick Association will gladly furnish data and descriptive information on resurfacing to those desiring it. The address is 1245 National Press Building, Washington, D. C.

A good pavement after 42 years is Whittlessey Ave., Norwalk, O. Maintenance cost—practically none.

***use the old Pavement . . . . . resurface it with* BRICK**

FORWARD STEPS

Reported by
Municipal Officials, Chamber of Commerce Executives, and Others

San Diego's $300,000 Bond Issue Aids Recreation Expansion Program

SAN DIEGO, CALIF.—The unemployment problem in San Diego is being handled on a basis that is proving of great value both to the city and to the individuals affected. Hundreds of workers are provided with employment in the city's famous Balboa Park, where recreation facilities are being added, some of which will prove a source of revenue to the city, and all of which will add to the health and pleasure of the citizens. The sum of $320,000 has been set aside for this purpose.

Estimates from various sources in the fall of 1931 showed that from ten to sixteen thousand men were out of work. The city officials decided that about $300,000 would be necessary to tide these men over until spring. They therefore decided to submit a bond issue of $300,000 to the voters at an election in December.

Suggestions for methods of using the money were asked from various organizations, and a great many ideas were submitted. The City Council determined that no project having less than 60 per cent hand labor would be considered, and that as much work as possible should be done in Balboa Park, so that the entire city would benefit from these expenditures.

The following list was finally adopted and presented on the ballot: (1) three pedestrian tunnels under El Cajon Avenue—$18,500; (2) a pedestrian tunnel under Park Boulevard—$4,300; (3) grading at Ninth Avenue, between Robinson and Upas Street—$8,100; (4) grading Miramar Road across Pueblo Lots 1307 and 1308—$21,000; (5) construction of recreation area and facilities in northeast corner of Balboa Park—$65,100; (6) construction of regulation standard eighteen-hole, all-grass golf course in Balboa Park—$100,000; (7) grading of an east-and-west road in Balboa Park connecting Twelfth Avenue and Pershing Drive—$73,000; (8) construction of baseball field and appurtenances on tide lands in vicinity of the end of Beardsley Street, to be operated by the Playground Department—$5,000; (9) construction of vehicle parking area in Balboa Park near the Alameda—$5,000.

As the money from the bond issue, providing it carried, would not be available for several months, $20,000 was appropriated by ordinance to start relief work. It was determined that an additional eighteen-hole, championship size golf course should be planned and the first nine holes started with the money. This would provide several months' work for a large number of men, and with the carrying of the bond issue the additional $100,000 would complete the entire 18 holes.

MUNICIPAL GOLF COURSE, SAN DIEGO

The fifth item on the ballot, for the construction of a recreation area in the northeast corner of Balboa Park, meant the completion of a plan developed a number of years previously by the Board of Park Commissioners. This area, embracing 45 acres of level ground, will have within its confines a swimming pool, 50 by 100 feet, together with the field house for lockers, rest rooms, etc. For adult recreation, there will be provided twenty shuffleboard courts, nine tennis courts, ten horseshoe pitching lanes, two roque courts, three basketball courts, three standard baseball diamonds, and an indoor baseball diamond. Plans call for increasing all of these facilities to at least twice and in some cases three times the number of units designated here. The initial courts will be laid out with this in mind, thereby providing for expansion when additional facilities are required.

D. W. CAMPBELL,
San Diego Chamber of Commerce.

New Diesel Electric Plant Put into Operation

VERMILION, S. DAK.—The new electric light plant built by this city started operating at the beginning of 1932. It replaced the $60,000 steam plant built in 1919, which was quite successful financially, but for the past few years has been rapidly depreciating. Contracts for the new plant were let last spring, and are the culmination of several years of planning and investigation by the city authorities.

The new plant is located adjacent to the main line of the C. M. St. P. & P. Railroad, so that fuel oil can easily be unloaded. Substantial economies will be achieved in the fuel item alone, for the coal for the old plant was unloaded from the cars by hand, hauled up an 11 per cent grade with horses, unloaded at the plant by hand and fired under the boilers by the same method. As only a limited amount of exhaust steam was used for heating, the plant was not as efficient as was desirable to take care of a growing load.

The new building is 44 x 72 feet, two stories high, with a full basement under it. It is built of steel and reinforced concrete with face brick, stone trimming and mill-type windows. As soon as weather permits, the grounds will be landscaped to present an attractive appearance. Entrances are on the east and west. On the east side is a one-story shop-office room with a locker room adjoining. To the west of this is the main part of the plant. Two Fairbanks-Morse diesel engines are installed. All engine auxiliaries, such as air compressors, fuel-oil pumps, lubricating-oil piping, etc., are in the basement. The engine room is thus kept clear and presents a fine appearance. The switchboard is on the south side of the building.

A staircase leads to a platform-like space over the shop which will be used for storage. Overhead is a large traveling crane which moves on tracks the entire length of the building. In the basement

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is the furnace for heating the building. Four 20,000-gallon oil-storage tanks are buried east of the building. A pump room and pipe gallery are provided in the basement at this end of the building. Piping is arranged so that oil may be unloaded from the cars into any tank or circulated from one tank to the other.

The cooling system, consisting of a 1,000-hp. spray tower and indirect shell and tube coolers, is located west of the building. The water in this locality is very hard and does not come in contact with engine cooling surfaces.

The two diesel engines are each rated at 525 hp., with sufficient overload capacity so that either unit could pull the present peak load of the plant. The largest peak load reached in the old steam plant was 430 kw. Space is provided for a third unit as the load increases.

The building, storage tanks, traveling crane, engine foundations and conduit from the plant to the edge of the business district, cost $32,065. The engines and auxiliaries cost $50,625; the switchboard, $12,251; the plumbing and heating, $4,927, and the cooling system, $8,022.

The steam plant had been operating at increasing costs. During the past summer the pressure on the boilers was lowered from 150 pounds to 125 pounds by the inspector, and even then an employee was quite severely burned by the blowing-out of a connection. It has been necessary to use two boilers at once where previously only one was used. Ten tons of coal, costing $7.20 a ton, has been used daily.

Prior to the installation, Mayor Carl Viers said, "After the new plant is in operation and we see what the cost of electricity on the switchboard and in distribution is, we plan to make a reduction in the rates if the operating costs warrant it, but at this time it is too early to say definitely." The first month's operation of the new plant bears out the claims of the engineer and the expectation of the City Council that they would save $1,000 or more a month over the operating cost of the old plant. It is obvious that the saving will pay for the new plant in a short time.

The old municipal building will continue to be headquarters for the City Auditor and the Fire Department. The portion of the building vacated by the plant itself will be turned into a machine and storage shop. Possibly a city jail will be installed, but the Council has not yet taken any formal action on the old plant's disposition.

Electricity was brought to the city in the '90's by E. D. Brookman and John R. Barrett, who installed a plant in their old mill, which stood where the municipal building now stands. The city bought this plant in May, 1915, at a cost of $15,000, and operated it until a bond issue was voted to build a new plant in 1919. Two sons of one of the founders of the first electric light plant in Vermilion are still closely connected with city affairs. Harold Brookman, an engineering professor at the University of South Dakota, is a member of the City Council, and Lowell Brookman is City Electrician.

The new light plant is the third major municipal improvement in Vermilion in the last three years. In 1929 the $27,000 swimming pool was built at Prentis Park and the $16,000 water filtration and softening plant was installed. At the same time a new well was sunk, which saved the city from a water shortage during the dry summers of 1930 and 1931. The new light plant adjoins the filtration plant on the west.

The new plant was designed by the city's consulting engineer, Charles A. Trimmer, of Madison, S. Dak., and it was made possible by the loyalty and fine spirit of cooperation of the Mayor and City Council, who had the support of the entire community.

D. A. CALDWELL.

"MOWING" A FROZEN LAKE

Heavy-Duty Power Mowers Used as Snow-Plows

DENVER, COLO.—The skating public were well pleased, during the season just past, with the smoothness of the five lakes in the city's park system, which they are permitted to use at all times when the ice is safe. Until the fall of 1930 the snow was removed from the ice by means of hand pushers, and its removal was slow and arduous work. That year, however, we conceived the idea of equipping two 4-Acre heavy-duty power mowers with snow-plows. The results were most gratifying. Where ten men formerly spent three days in cleaning four inches of snow from the small lake in City Park, four men now do the same work in eight hours and do a much better job. One team is used in both cases.

Owing to the great power of the 4-Acre, we can push as much as four inches of snow. The method used is to stack the snow in windrows and drag it off with a team and snow-sled of our own make. I use an oak board 1 in. x 12 in. x 4 ft., with a bottom knife. At first steel was tried in place of the board, but wood cleans more satisfactorily.

The snow remover will not plane the ice. A planer is used first, and is followed by the 4-Acre, which is so constructed that the snow-plow is easily attached. This year (1932) I built eleven snow-plows. All worked splendidly. Nevertheless, a few improvements are in mind for next year. I fill both wheels with lead for traction and spike them.

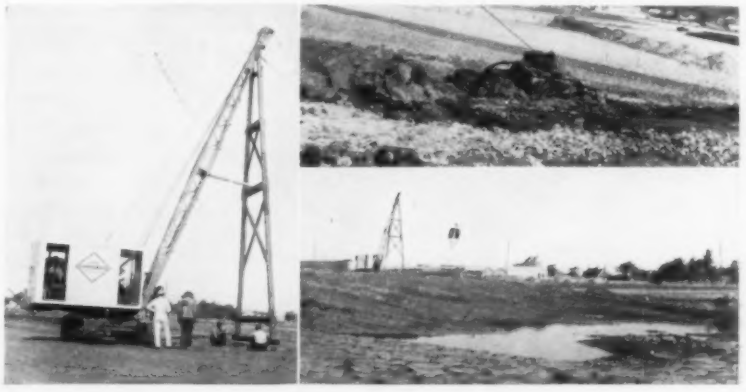
The Park Department will start the lawn-cutting season of 1932 with a 31 Jacobsen 4-Acre heavy-duty power mower.

CHARLES B. HART,
Park Department, City and County of Denver.

Ugly Marsh Converted Into Park

MONTEREY, CALIF.—An old marsh that could be seen by all who entered Monterey by train or motor-car, and which in the rainy season and during high tide covered 30 acres, is being converted into El Estero Park, to have a water area of 18 acres with a normal depth of 5 feet, and an island or two. Shrubs, trees and grass are to be planted along the shores. The plan followed is that of Olmsted Brothers, landscape architects, of Brookline, Mass.

It is estimated that an excess of 80,000



BUILDING A PARK OUT OF A MARSH IN MONTEREY, CALIF.
Left—Osgood Commander rigged for service as a slack-line cable way. Upper right—Pulling through the blue clay marsh bottom. Lower right—A general view of part of the job, showing the even grade of the shore line

PUBLIC PROPERTY *needs the protection of this* STURDY FENCE

Public property is peculiarly susceptible to the invasion of tramps, thieves, loiterers and mischief makers. It will save the tax-payers money to protect all public works such as airports, playgrounds, schools, golf courses, waterworks, reservoirs, workhouses, jails, hospitals, infirmaries and sewage disposal plants with a strong fence.

Pittsburgh Chain-Link Fence represents the highest standards of effectiveness, durability and economy. Made of rust-resisting copper-bearing steel and heavily coated with zinc after weaving, Pittsburgh Chain-Link Fence is ideal for municipal projects. Erected on a sturdy frame of seamless steel pipe terminal posts and solid "H" section line posts, it will resist shocks and give remarkably long service.

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cubic yards of sand and blue clay mixed with decayed vegetable matter must be moved from about the center of the marsh to the banks, to form an irregular shoreline. The maximum distance the material must be moved is 300 feet, and the normal depth of 5 feet must not be exceeded. In some spots the material is compacted and very difficult to dig, causing the scraper bucket to ride over the area being scraped. Teeth were bolted to the lip of the scraper, which partially corrected the slipping and sliding of the bucket.

The scraper bucket used was built by the contractor and has a capacity of 67 cubic feet. It is hauled in, fully loaded, at a speed of 180 feet per minute, and returned by gravity a distance of 250 feet in 12 seconds. An Osgood Commander crane with a 50-foot boom is being used, with the boom supported by an "A" frame attached to the boom points. In moving laterally, the operator releases the slackline and lifts the boom, then moves in the direction desired and sets the boom down on the frame again. Satisfactory anchorage is afforded by trees on the opposite bank, some as far as 500 feet from the machine. A ¾-inch cable is used for the slackline.

Yardage moved per day has varied according to the distance hauled. Where the average haul has been 180 feet and the material loose, the system has moved 800 cubic yards into place in an 8-hour day. The operator has been able to finish the shore to a satisfactory grade by manipulation of the slackline as the load is being hauled in.

W. J. BEATTY.

Tax Study Clubs— The Kansas Plan

TOPEKA, KANS.—"Taxes must be reduced!" While the country has been sliding down from the prosperity peak of 1929, this cry has been sounded and echoed through the newspapers, the magazines and technical press with a volume and insistence which could not be denied by public officials and others in positions of responsibility relative to governmental affairs. Unfortunately, this public outcry, for the most part, has demanded a result without suggesting an intelligent method of getting it. Such suggestions of method as have been made generally fall into two classes: first, tax the other fellow; or, second, reduce the total cost of government. Examining these two from the viewpoint of any one taxpayer, it is usually found that his wishes are to the same point, in whichever category they may fall. He is thinking of shifting his tax burden to someone else or of reducing the quantity or quality of governmental services being rendered to some class of society of which he is not a member. The whole problem becomes very complex and the public is not unlikely to seize the old "remedy" and "get rid of the crooked administration."

Believing that informed public opinion is the only means by which intelligent reform may be accomplished, Kansas is attacking this perplexing question in a way which seems to be without precedent and which promises substantial results. The Kansas State Farm Bureau, the State Grange, the Farmers Union, the University of Kansas and Kansas State College have been brought together under the leadership of the Kansas (state) Chamber of Commerce in the writing and distribution of thirteen lessons on the fundamentals and history of taxation. The local chambers of commerce and other cooperating organizations are forming tax study clubs. These are groups of twelve to fifteen taxpayers, men and women, who meet one evening a week for the reading and discussion of one of the thirteen lessons. In the rural regions, clubs are meeting in schoolhouses and homes. In the cities, clubs are being organized through all manner of local organizations, from Rotary to women's clubs, and these are meeting at their respective headquarters. Lessons are being distributed from the office of the Kansas Chamber of Commerce, the office of the Kansas Farm Bureau and the local chambers of commerce.

The lessons were received from the printer and the first mailing made early in March. A descriptive pamphlet had been sent out three weeks before. Orders are being received daily, though their volume has not made itself felt, since the larger cities are in the stage of preliminary organization. It is interesting to note, however, that a check-up of the individual orders received up to March 25 at the Kansas Chamber, which represent less than a third of the total, shows that these have come from 105 towns in 67 of the 105 counties of the state. Interest in the project seems to be confined to no one section.

The Kansas Chamber of Commerce could find no pattern or previous experience to follow in this undertaking. It is an adventure supported, on the one hand, by the conviction that the greatest service which can be performed by a chamber of commerce is that of creating informed public opinion, and, on the other hand, by the judgment of educators, including Chancellor E. H. Lindley of the University of Kansas and Dr. F. D. Farrell, President of State College, that large masses of the public really want the facts. While the test is only in its initial stages, results to date would indicate that this faith in a chamber of commerce ideal and belief in the soundness of democracy, will have ample support in a quite amazing public response.

The Kansas Chamber of Commerce has a Tax Committee which will write a program to be submitted to the Legislature at its 1933 session. This program will recommend definite changes in our taxing system, and an appeal will be made for popular support of its recommendations; but this is all apart and separate from the tax study club plan. The greatest care has been exercised to insure that the study club lessons deal only with fundamentals and facts and contain no hint of propaganda. The gist of the whole project is found in the following paragraph quoted from the preliminary announcement:

"There has been no attempt to dictate a tax program. The tax study club plan is a democratic instrumentality, based upon the supposition that when the people have the facts, their decisions will be in the public interest. When the taxpayer has conscientiously studied the thirteen topics, he will be in an exceptionally able position to decide the relative merits of whatever tax proposals may come before him."

SAMUEL WILSON,
Manager, Kansas Chamber of Commerce.

INCONSISTENCIES

BANKS and bond houses demand that municipalities reduce their expenses, *BUT they insist that the municipalities pay a high rate of interest (in many instances as much as the law permits them to charge) on municipal bonds and certificates, and they either refuse to pay any interest or insist that the prevailing rate be reduced on daily bank balances.*

Coal dealers object to a tax on gasoline, *BUT petition government to place a tax on fuel oil.*

Organized labor demands that local tax levies be reduced, *BUT insists that municipalities adopt the five-day week and not reduce the labor wage scale.*

Local chambers of commerce and merchants demand that their municipalities reduce expenses, *BUT they howl when a municipal purchasing official purchases a set of tires outside for half the price he would have had to pay to a local merchant.*

Newspapers pound the municipal administration editorially for a reduction of the city or village budgets, *BUT they strenuously oppose any suggestion to reduce the amount of unnecessary election advertising or printing.*

Motorists insist that governments keep highways safe for traffic, well lighted, well paved and clear of snow, *BUT they object to a gasoline tax to help pay for these improvements and services.*

You-should-do-this-but-you - must - not - disturb that, is as popular a pastime in government as contract bridge is in society. Advice on government is almost as inconsistent as radio advertising. The Sino-Japanese quarrel is puerile in comparison with the conflict of self-interest over tax reductions.

Oh, for a genius who can devise some plan which will eliminate conflicts of self-interests in the administration of local government. And what a genius he would be!

—From March 1 Bulletin of New York State Conference of Mayors and Other Municipal Officials.

THE HUNDREDS of thousands of miles of gravel and old macadam roads that need widening and rejuvenating constitute America's most

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GOOD ROADS at LOW COST

The Municipal Bond Market

By SANDERS SHANKS, JR.
Editor, *The Bond Buyer*

FISCAL officers of municipalities have reason to feel greatly encouraged by the improvement that has taken place in the market for municipal bonds in recent weeks. Assuming that the market from now on will suffer no serious setback, the middle of February may be considered as marking the low ebb of the outgoing tide of municipal credit. Coincident with the initial success of the Federal authorities in their efforts to stabilize the banking situation, activity in what had been an almost completely stagnant market for both short- and long-term municipal paper set in. By the middle of March, dealers specializing in the underwriting of new bond issues were again competing actively for bonds advertised for public sale and, in the New York market, it may be stated that for the first time in almost six months all dealers are now sufficiently confident of the stability of the market to again stock their shelves with bonds.

The wave of hysteria which swept through the ranks of bond investors in the closing months of last year and early this year, causing an untold amount of indiscriminate dumping of perfectly sound state, city and other municipal securities, is disappearing. Realization that much of the sensational publicity given to municipal financial difficulties was grossly misleading is seen in the desire of both individual and institutional investors to buy back bonds sold during the recent months of despondency which followed England's suspension of gold payments.

Amount	Municipality
$ 300,000	Newton, Mass.
1,225,000	California
2,500,000	Missouri
4,500,000	Allegheny Co., Pa.
100,000	Wellesley, Mass.
400,000	Greenwich, Conn.
6,160,000	Rochester, N. Y.
507,000	Trenton, N. J.
1,482,000	Minneapolis, Minn.
130,000	Spokane, Wash.
139,159	Columbus, Ohio
150,000	Danville, Va.
3,550,000	Nassau Co., N. Y.
2,530,000	Yonkers, N. Y.
1,561,000	Essex Co., N. J.
1,000,000	New Mexico

The municipal bond market is not by any means in normal shape yet, but there is ample evidence to indicate that it is making satisfactory progress in that direction.

The following is a list of recent sales of new issues of state and municipal bonds, showing the net interest rates at which the loans were placed:

Rate (%)	Maturity	Net Basis (%)
4½	1-15-yr. (ser.)	4.20
4½	9 1/3-yr. (avg.)	4.41
4¾	16¾-yr. (avg.)	4.50
4¾	15½-yr. (avg.)	4.62
4.67	9 mos.	4.67
4½ & 5	12½-yr. (avg.)	4.64
4½, 5 & 6	8 1/6-yr. (avg.)	4.75
5	13½-yr. (avg.)	4.92
4¾	7 1/3-yr. (avg.)	4.93
5	6 1/3-yr. (avg.)	4.99
5¼	6 1/6-yr. (avg.)	5.22
4½	12½-yr. (avg.)	5.35
5½	5-yr.	5.50
5 & 6	7½-yr. (avg.)	5.74
6	5-yr.	6.00
6	8½-yr. (avg.)	6.00

A New England City Solves Its Fiscal Problems

By CHARLES A. HARMON
Meech, Harmon, Lytle & Blackmore,
Buffalo, N. Y.

THE officials of our larger American municipalities would do well to examine the results achieved by the balanced programs of many smaller communities. For, regardless of the size of a city, a county, or a town, it will be found that the methods by which good administration are attained apply.

The city of Belfast, Maine, is a case in point. It is not in any sense of the word a metropolis. But if the fiscal problems of the city would seem small if compared with the gigantic ones of New York, Chicago or Cleveland, these same problems, when viewed with reference to the city's financial resources, are—or were—no less serious.

The fiscal affairs of the community reached a climax in 1929, a time when other municipalities were still feverish with the effect of inflation. The end of the fiscal year 1929-1930 found the city with an installment of bond interest coming due which it could not meet. Funds provided for that purpose in the current budget had been dissipated over other activities, and it was only by the intervention of local bankers that the city was saved from default. In justice to the administration in charge of the city's affairs in that year, however, it is only fair to state that it had been the practice for more than a decade for the bond interest becoming due each February 15 to be paid by the new administration which came into office in March of each year.

But this represents only part of the story. Temporary borrowings had fallen due, with not enough money left in the treasury to run the city for a week. State and county taxes for the year, collected through the agency of Belfast and payable to the state of Maine and the county of Waldo, had been so collected and *spent*. There were other large current accounts payable; and, relatively speaking, an almost ruinous amount of uncollected taxes. Industrial activities in the city were at a level which the country in general did not reach until many months later. To an outsider, at first sight, the situation would have appeared almost hopeless.

Not so, however, to the incoming administration, headed by one of the city's leading attorneys as Mayor, and the editor of the local newspaper as one of the members of the City Council. Through the efforts of the Mayor a new charter had been rushed through the State Legislature providing for a city manager to replace the old type of mayor-executive. A non-local man, Harrie D. Eckler, of Frankfort, N. Y., was selected, and immediately upon assuming office he began to act. Under the charter the task of constructing the budget for the ensuing year was in the hands of the city manager, but for the first year, before a manager had been engaged, the City Council undertook this, the city being financed temporarily by tax anticipation loans.

Council Develops Sound Financial Program

The first step of the new Council was to call for an examination of the records which would provide a precise definition of Belfast's fiscal situation and problems, its resources, and its immediate financial necessities.

The examination revealed a current deficiency which amounted to almost 15 per cent of the city's annual tax levy. Needless to say, it further disclosed the vicious effects of improper accounting, of a total lack of budget control, of unsystematic and irresponsible purchasing, of questionable "personnel" practices, of lax tax collections, of unsound and misleading budgets. These are common faults; it is the energy and promptness with which they were corrected that is refreshingly novel.

The first act required courage. It was for the Council to insist that the tax levy for the succeeding year should be sufficient, not only to pay for the sharply reduced current expenses proposed by the budget, but also to cover about half of the current deficiency, and, in addition, set up reserves against uncollected taxes. In other words, it was proposed at one stroke to place the city in a position in which it could discount its bills and relieve itself of the necessity for further temporary borrowings.

By good management and careful control of expenses by the new City Manager, at the close of the first year, in March, 1931, the city found it had been able to pay off, out of savings in various appropriations, even the half of the temporary debt of the previous administration not provided for specifically in the budget.

The protest of taxpayers—who as usual had expected the mere appointment of a city manager to be sufficient to secure tax reduction—was met in a

"Slow Down, Death!"

MOTORCYCLE POLICE PROVE MOST EFFECTIVE

Read over our 1932 Police Booklet. It will give you much useful information on Traffic Control and our latest model Police Motorcycles. You will file it for reference. Copy free on request.

Direct, aggressive action is needed to cut down the grisly toll of automobile fatalities.

Propaganda and editorial attacks upon reckless motoring help, but do not suffice.

Police action is the vital necessity — and constant patrolling by Motorcycle Squads has proved the most effective police action. This is clearly shown by the records of cities with decreasing accident totals.

Most of these cities use Harley-Davidson Motorcycles, which have proved the most dependable and economical for police service.

HARLEY-DAVIDSON MOTOR COMPANY
Department M. Milwaukee, Wisconsin

HARLEY-DAVIDSON

The Police Motorcycle

practical manner. In the face of past experience, mere pledges were considered useless. The City Manager therefore secured the adoption by the Council of a set of fiscal regulations which would provide for the disposition of the funds exactly as proposed. In short, behind the budget there was placed the force of ordinances which guaranteed that the close of the city's next fiscal year would find it with a workable surplus, and which regulated the system of accounts, purchasing, personnel, budget control, and other major matters connected with the city's financial problem.

The City Manager's program of work for his first fiscal year was "sold" to the taxpayers by these concrete evidences of sincerity, and the program was carried through exactly as scheduled. Confidence was retained throughout that year by monthly statements understandable even by the layman, with the result that, despite the high tax rate, unpaid taxes for the year were considerably less than they had been for a long time. In addition, a drive upon old taxes, backed by this renewed confidence of the taxpayers, netted so well that by the end of 1930 this item has been reduced 40 per cent; and at the end of 1931 by almost 50 per cent.

The development of the financial plan with its safeguarding ordinances; its support by the taxpayers and the entire Council; and the competent manner of carrying it out, have produced a situation where the future can be viewed with confidence.

You and Your Government

CIVICS and government will be the subject of a series of radio lectures to be broadcast on Tuesday evenings, from 8 to 8:30, beginning April 5, under auspices of the Committee on Civic Education by Radio, appointed by the National Advisory Council on Radio in Education in cooperation with The American Political Science Association. The series will be broadcast over a nation-wide network of stations of the National Broadcasting Co. John Dewey, Charles A. Beard, John Finley, Charles E. Merriam, William Bennett Munro and Stuart Chase are included in the list of speakers. The Chairman of the Committee on Civic Education is Thomas H. Reed, Professor of Political Science, University of Michigan.

The purpose of the lectures is to present careful, timely statements on subjects of current political interest. Leading educational authorities have cooperated to make this program suited to the capacities and educational needs of high school pupils in the eleventh and twelfth grades.

During the months of April and May these programs will be conducted jointly by the Committee on Civic Education by Radio and the National League of Women Voters, and will continue the Voters' Service which has been on the air since January. The purpose of this service has been to give disinterested information and many sided discussion in regard to the leading issues before the country and the voters' relation to them.

Land Condemnation Reforms Enacted in New York State

IMPROVEMENTS in the procedure for the condemnation of land, recently recommended by Leonard M. Wallstein, as special Assistant Corporation Counsel for New York City, and reported in THE AMERICAN CITY for March, at page 113, have been made law. Bills providing for important changes in the rules of evidence affecting the taking of land by a city have passed the Legislature and been signed by Governor Roosevelt. They authorize the introduction, as evidence, of sales and other indications of market value of property adjacent to the land under condemnation, and likewise, the introduction of assessed valuations. The Legislature also adopted a constitutional amendment that would authorize setting up a condemnation court for New York City, composed of one or more Supreme Court justices. This did not have to be signed by the Governor, but will be submitted to popular vote after repassage.

A Recent City Manager Appointment

L. T. NEIN, former City Auditor and former Butler County Treasurer, was appointed City Manager of Middletown, Ohio, to succeed L. A. Waldner. He will take office April 1.

CLARENCE E. RIDLEY,
Executive Director, The International City Managers' Association.

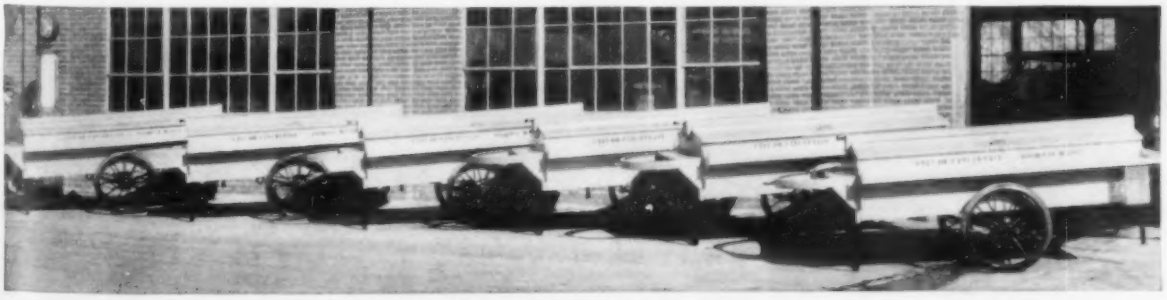
Cincinnati Uses Portable Tool Boxes

AS a means of successfully operating on a curtailed budget, the Department of Highways of Cincinnati is using a fleet of twenty-two all-steel portable tool boxes which can be hitched behind trucks with a simple coupling and hauled to any part of the city for use. Formerly it was necessary to have a gang of men load the cumbersome stationary tool box into a truck, and very often a great many tools had to be taken out so that the box could be lifted, and all of these processes took time.

The city keeps these portable boxes completely equipped and they are always ready for instant use. Such equipment is particularly valuable on emergency work. If a tool box is needed somewhere quickly, the truck operator can hitch it up himself and be on the job in less time than it formerly required to get a gang of men to load the stationary box onto a truck.

The portable feature, moreover, leaves the bed of the truck available for other uses. Further, the trucks are not tied up on the job. The truck can start out with two or three of the portable boxes in tow, drop them at proper locations and proceed with other work. A plan of systematic shifting of tool boxes can be worked to great advantage.

The locking arrangement on the tool boxes was the result of close cooperation between the Cincinnati Department of Highways and the manufacturer. There are no padlocks, just a positive locking mechanism that by means of one lock fastens the double covers simultaneously the full length of the box. On large jobs, where tool boxes are left on the street, it is no longer necessary to keep a watchman through the night, as unauthorized persons cannot break into these fully locked tool boxes.



PART OF THE FLEET OF 22 LITTLEFORD HANDEEBOXES OWNED BY THE DEPARTMENT OF HIGHWAYS, CINCINNATI, OHIO

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Prepared by
FRANK B. WILLIAMS
Author of "The Law of City Planning and Zoning"

ZONING and PLANNING NOTES

From Data collected by the Zoning Committee of New York (233 Broadway)

Zoning—Variance

DISTRICT OF COLUMBIA.—*Bugher v. Gottwals*, 54 Fed. 2d, 451.—This is a suit for a mandatory injunction to compel the Zoning Commission of the District to re-zone as commercial certain lots in a residential district. The bill alleged that other property on the same street was and ought to be commercial; that buildings on plaintiff's lots were vacant and had been vacant for some time, although every effort had been made to attain tenants therefor; and that assessments had so increased as to be too high to permit the property to be used for residential purposes; that the re-zoning of the property would not affect the general scheme adopted by the Commission, or defeat the plan to preserve the adjoining street as residential; and that no person had objected to the granting of the petition for re-zoning, but that nevertheless the Commission had refused so to do.

Injunction refused. The Court is not warranted in substituting its own judgment for that of the zoning authorities. Case remanded to lower court for hearing on its merits.

Non-Conforming Use—Estoppel

DISTRICT OF COLUMBIA.—*District of Columbia v. Cahill*, 54 Fed. 2d, 453.—The building in question was erected in 1911, and continuously thereafter the first floor was used as a garage, although there was no permit so to do. In March, 1920, a zoning ordinance was passed placing the locus in a residential district. In March, 1926, the appellee purchased the property and applied for a permit to fireproof and repair the premises and use the first floor as a garage; which was duly issued. Appellee thereupon expended $6,000 on premises to fit the first floor for use as a garage, but without structural changes to building.

In 1927 the Board of Commissioners of the District of Columbia notified the owner that the permit would be revoked on the ground that it was issued under a "mistake of fact," no permit having been issued for use of the premises as a garage until 1926, as above stated, *Held*, that the District was estopped from revoking the permit.

Zoning—Constitutionality

MISSISSIPPI.—*City of Jackson v. McPherson*, 138 So. 604.—Zoning ordinances are valid in Mississippi.

NOTE BY EDITOR.—The majority opinion contains an excellent statement of the progress of zoning in the courts of this country.

Eminent Domain

MINNESOTA.—*State v. Erickson*, 239 N. W. 908.—The order of the State Highway Commissioner designating a permanent re-routing of a trunk highway is conclusive on the courts on the question of the necessity of taking the property, but does not in itself constitute a taking.

Real Property—Incumbrances

NEW YORK.—*Junius Construction Co. v. Cohen*, 257 N. Y. 393.—The defendant made a contract to sell a parcel of land in New York City, listing two unopened streets on the city map as incumbrances, but failing to list a third street, which, if opened, would divide the lot into two parcels and prevent its use for the purpose contemplated by the plaintiff. *Held* that, without deciding whether or not any of the unopened streets were incumbrances, the listing of two such streets and the failure to list a third, which might affect the lot so seriously, was misrepresentation, preventing specific performance of the contract of sale.

NEW YORK.—*Boeringer v. Montallo*, 142 Misc. 560.—The plaintiff conveyed the property by full covenant deed, subject to two mortgages, monthly tenants, and the zoning ordinances of the city of Yonkers. It now appeared that the Bronx Valley Sewer Commission had condemned the right to construct, and had constructed, a sewer across the property at a depth of over 150 feet. The judgment of condemnation provided no right of access from the surface of the property. *Held* that this right, at that depth, was not an incumbrance; or if it was, the damages would be nominal.

Board of Appeals

NEW YORK.—*Matter of Finger (Connell)*, Supreme Court, Bronx County, *N. Y. Law Journal*, February 19, 1932.—The courts cannot substitute their judgment in administrative matters unless the board's action was "capricious, arbitrary, or tyrannical."

NEW YORK.—*Matter of Grilli (Gonnell et al)*, Supreme Court, Kings County, *N. Y. Law Journal*, February 26, 1932.—This is an application to confirm an order of certiorari to set aside a decision of the Board of Standards and Appeals and to grant a permit for a gasoline service station in Brooklyn. The application is granted. There are similar uses in the neighborhood, and a number of similar permits have been granted by the Board. The action of the Board in attempting to reopen or reconsider the first action of the board (granting the permit) was therefore arbitrary and without warrant of law.

Board of Appeals—Conditions

PENNSYLVANIA.—*Appeal of Consolidated Cleaning Shops*, 157 Atl. 811.—The refusing to allow a given cleaning and dyeing establishment to burn coal instead of gas, the burning of gas being required when non-conforming use was originally permitted, was within the Board's discretion, and the Court will not interfere. Another such establishment was allowed by the Board to use coal, in a building which occupied its own block exclusively; where the first establishment was in closer contact with neighboring houses. *Held* that there was no unjust discrimination. The Board need not impose the same conditions on each non-conforming applicant within the same zone. The conditions may be changed in accordance with location, contiguity to other properties, and other varying elements which may enter into the matter.

Residential District

OHIO.—*State ex rel. Clifton-Highland Co. v. City of Lakewood*, 179 N. E. 198.—The introduction of business buildings in a residential district changes it in such a way as to affect public health, safety and general welfare adversely; therefore a permit for the erection of business structures in an apartment district is properly denied.

Oil Wells

OKLAHOMA.—*Gant v. City of Oklahoma City*, 6 Pac. 2d, 1065.—A city ordinance prohibiting the drilling of oil wells except on giving a bond to discharge liability for damages is valid.

NOTE BY EDITOR.—This ordinance was not part of a zoning ordinance; and there seems to have been no zoning ordinance for the city.

Permit

PENNSYLVANIA.—*Commonwealth ex rel. Shooster v. Devlin*, 158 Atl. 161.—A property owner holding a building permit and having started the erection of a building may stop before its completion and cannot be compelled to go on with it. A building permit is not a contract, but a permission to erect a building according to the plans and specifications submitted with the application therefor.

Zoning and Planning in Los Angeles

The Regional Planning Commission of the County of Los Angeles has issued its Sixth Annual Report. It contains, among other things, a summary of zoning activities during the year and a summary of some of the more important cases which have arisen during that time.

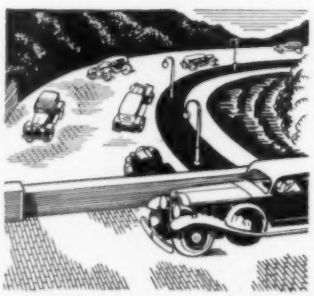
ZONING DECISIONS, 1931

as reported in The American City are indexed in the 1932 Municipal Index, and supplement the six years' cumulative record in the 1930 Index, and that in the 1931 Index.

A NOTABLE ENGINEERING FEAT CROWNED BY A MODERN BRICK-SURFACED PAVEMENT

White House Crossing Bridge—Opened October, 1929

THE White House Grade-Crossing—most dreaded in Ohio—*was avoided* whenever possible by the knowing motorist. It had cost the lives of 89 people and thousands of dollars worth of property. ◪ After years of study, legislation and negotiation with the railroads involved, this grade-crossing was finally eliminated in 1929. The bridge that now spans it is 1375 feet in length. The approaches are 829 feet on the west and 200 feet on the east. ◪ It is fitting that this fine span, which has been called "the gateway between Cleveland and the industrial cities of Akron, Canton and the Mahoning Valley," should be crowned by a Modern Brick-Surfaced Pavement. ◪ The White House Crossing Bridge is not only a notable engineering feat, but is also a monument to the progress of modern transportation. The brick surface was designed for permanency—as the bridge is permanent; it was designed for smoothness and beauty—even as the bridge is beautiful; and it was designed for the ultimate economy of the taxpayer—required, as was the bridge itself, by the economics of transportation.



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BRICK PAVEMENTS

THE CITY'S LEGAL RIGHTS AND DUTIES

Conducted by A. L. H. STREET, Attorney at Law

Accidents

City held not liable for defect in approach to fire station not part of public sidewalk (Massachusetts Supreme Judicial Court: *Abihider v. City of Springfield*, 177 N. E. 818).

City held negligent in failing to safeguard visitors to a park and playground against danger of falling into lake from a steep, slippery bank (California District Court of Appeal: *Magnuson v. City of Stockton*, 3 Pac. 2d, 30).

City held not liable for injury to pedestrian falling on slanting concrete approach across sidewalk rendered slippery by freezing (Wisconsin Supreme Court: *Thiele v. City of Green Bay*, 238 N. W. 834).

City held not liable for injury to child through fall of beams negligently piled by contractor in street (New York Supreme Court, Appellate Division: *Hayling v. City of New York*, 253 N. Y. Supp. 610).

Bond Issues

Bonds held not "authorized" unless provided for by ordinance (Ohio Supreme Court: *State v. Thatcher*, 178 N. E. 843).

Business Regulations

Ordinance imposing license fee on dispensing near-beer upheld (Ohio Court of Appeals, Cuyahoga County: *Levitt v. City of Cleveland*, 178 N. E. 593).

Cemetery Abandoment

City held not liable for removing body from abandoned cemetery (Ohio Court of Appeals, Richland County: *King v. City of Shelby*, 178 N. E. 22).

Civil Service

Civil service office may be abolished for good of service (Ohio Court of Appeals, Stark County: *Board of Health of City of Canton v. State*, 178 N. E. 215).

Chief of police held properly exempted from civil service examination (Ohio Court of Appeals: *Jones v. State*, 177 N. E. 507).

Council Meetings

Council president held entitled to vote as councilman, although acting in mayor's absence (New Jersey Supreme Court: *Freint v. Borough of Dumont*, 157 Atl. 382).

Failure to notify councilman of special meeting did not vitiate meeting which he could not have attended (Ohio Court of Appeals: *Ambos v. Campbell*, 178 N. E. 320).

Delinquent Taxes

Judgment for taxes held enforceable against after-acquired property (Georgia Supreme Court: *People's Credit Clothing Co. v. City of Atlanta*, 160 S. E. 873).

Enforcing Judgments

Municipalities held empowered to purchase property at execution sale under judgments in their favor (Idaho Supreme Court: *Evans v. Power County*, 1 Pac. 2d, 614).

Engineering Services

Engineer not completing contract to draw water-works plans, etc., held not entitled to more than reasonable value of services rendered (Texas Court of Civil Appeals: *McAlister v. City of Mertens*, 43 S. W. 2d, 651).

Garbage Disposal

New Jersey held entitled to enjoin New York City from polluting beaches, etc., through ocean garbage dumping, after opportunity to erect disposal plant (United States Supreme Court: *State of New Jersey v. City of New York*, 51 Sup. Ct., 519).

Health

Ordinance for quarantine of persons infected with venereal disease upheld (Missouri Supreme Court: *Ex parte Lewis*, 42 S. W. 2d, 21).

Improvement Assessments

Charter requirement for sixty days' notice to file objections to improvement assessments held not complied with by notice first published February 28 to file objections on or before April 28 (Colorado Supreme Court: *Miller v. City and County of Denver*, 5 Pac. 2d, 875).

Purchases

City's purchase of 99-year lease on apartment house properly held illegal (United States Circuit Court of Appeals, Fifth Circuit: *Hoskins v. City of Orlando, Fla.*, 51 Fed. 2d, 901).

Mere agency of city commissioner for private corporation held not to vitiate city's purchase from such corporation (Texas Court of Civil Appeals: *City of Edinburg v. Ellis*, 42 S. W. 2d, 291).

Salaries

City marshal was not entitled to greater compensation than fixed by ordinance at time of appointment, despite pre-appointment agreement (Texas Court of Civil Appeals: *Bickle v. City of Panhandle*, 43 S. W. 2d, 640).

Sewage Disposal

City held liable for contaminating air and stream in sewage disposal (Georgia Court of Appeals: *City of Barnesville v. Parham*, 160 S. E. 879).

City held liable for offensive odors caused by permitting sewage to overflow property (California District Court of Appeal: *More v. City of San Bernardino*, 5 Pac. 2d, 661).

Sewer Assessments

County auditor and treasurer held necessary parties to suit to enjoin collection of sewer assessment (Ohio Court of Appeals, Cuyahoga County: *Scherler v. Village of Maple Heights*, 178 N. E. 335).

Sewer assessment held not assailable on ground of damage to property, owner not having filed statutory claim (Ohio Court of Appeals, Cuyahoga County: *Scherler v. Village of Maple Heights*, 178 N. E. 335).

Street Improvements

In determining sufficiency of protest against street improvement, frontage represented by exempt public property held not properly considered (Arizona Supreme Court: *City of Phoenix v. Wilson*, 5 Pac. 2d, 411).

Street Railroads

Reasonableness of ordinance requiring two-men operation of street cars held doubtful, entitling company to preliminary injunction (United States District Court, Northern District of Georgia: *Georgia Power Co. v. Borough of Atlanta*, 52 Fed. 2d, 303).

Tax Revenues

Municipalities held empowered to assign past-due tax certificates for less than amount due when full collection impossible (Florida Supreme Court: *Ranger Realty Co. v. Miller*, 136 So. 546).

Unlawful Assembly

Right of policemen to disperse Communist street meeting that blocked traffic upheld (Los Angeles Superior Court, Appellate Term: *People v. Anderson*, 1 Pac. 2d, 64).

Utility Charges

Water consumer, not having paid rates under compulsion or protest, was not entitled to recover on theory it was entitled to a lower rate (Missouri Supreme Court: *National Enameling & Stamping Co. v. City of St. Louis*, 40 S. W. 2d, 593).

View Obstructions

State authorities held to have improperly erected screen at bridge approach to conceal sign on adjacent private property (New York Supreme Court: *Perlmutter v. Greene*, 249 N. Y. Supp. 495).

Wharves

Maintaining municipal wharf held proprietary function, rendering city liable for negligence (Oregon Supreme Court: *Hise v. City of North Bend*, 6 Pac. 2d, 30).

Workmen's Compensation

One transporting sand and gravel for city held independent contractor and hence not covered by Workmen's Compensation Act (Massachusetts Supreme Judicial Court: *Strong's Case*, 178 N. E. 637).

Airplane view of the Mt. Vernon Memorial Boulevard as it approaches the Potomac River opposite Washington, D. C. Carey Elastite Expansion Joint used throughout the entire length of this modern highway.

Carey Elastite

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HEAT INSULATIONS
ASBESTOS MATERIALS
CAREYSTONE CORRUGATED SIDING
ASFALTSLATE SHINGLES
BUILDING PAPERS

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MUNICIPAL AND CIVIC PUBLICATIONS

Prices quoted do not include postage, unless so stated.

Government

Modern Government in a Colonial City.—By Luther Gulick, Director, Institute of Public Administration. Jonathan Cape and Harrison Smith, New York. 1932. 258 *pp.* $3.00.

Taking as a basis the historic city of Williamsburg, Va., now undergoing extensive restoration, Dr. Gulick discusses the development of a governmental structure and mode of operation suitable for a small municipality, with special attention to the unique circumstances involved. John G. Pollard, former Mayor of the city and now Governor of Virginia, contributes a historical introduction. The Institute of Public Administration in 1930 added Williamsburg to the long list of cities for which it has made governmental surveys. The book is of general interest on account of its historic and philosophical background, and of special practical interest to small municipalities that may be in need of governmental change.

County Government

An annotated list of references on "County Government," covering the period June 1, 1915, to December 31, 1931, has been compiled by M. Margaret Kehl, Reference Assistant, Municipal Reference Library, and is published by the Library, which is a branch of the New York Public Library, in a 28-page bulletin. (Apply to the Municipal Reference Library, Municipal Bldg., New York.)

Township Government

The Bureau of Government of the University of Michigan publishes in a 7-page mimeographed bulletin (New Series No. 1), some tentative conclusions with respect to the position of the township in the governmental scheme, submitted by Arthur W. Bromage, University of Michigan, Chairman of the Sub-Committee on Township Government of the National Municipal League Committee on County Government. The conclusions consist of a brief summary of the township as it exists, a statement of the outstanding objections to township government, and proposals for its elimination as a political unit. 3c postage. (Apply to the Bureau of Government, Law Bldg., University of Michigan, Ann Arbor, Mich.)

School Traffic Club

Because drivers under twenty years of age are the most dangerous group, according to official records, the National Safety Council recommends setting up in every high school a regular class or course of instruction in the theory and practice of driving a motor vehicle. A suggested form of organization, which has been tried out in several schools, is outlined by the Council in a pamphlet entitled "A Program for Organizing a High-School Motor Traffic Club." 20 pp. Nominal price, 10c each; $7.00 per 100; single copies free on request. (Apply to the Council, 20 N. Wacker Drive, Chicago, Ill.)

Highway Safety

A typewritten report on "Building Safety and Facility into the Highway" has been prepared for the American Road Builders' Association by Maxwell Halsey, Traffic Engineer of the National Bureau of Casualty and Surety Underwriters, formerly Traffic Engineer for the Commonwealth of Massachusetts. The report covers 21 pages and includes many reproductions of photographs showing different types of highway design that embody principles of traffic safety and increase facility of use. The directness and understanding of human nature that are evident in this report, combined with good judgment and knowledge of the subject, make this study of great practical value. (Apply to Mr. Halsey at the National Bureau of Casualty and Surety Underwriters, 1 Park Ave., New York.)

City Managers

City Manager Yearbook, 1932.—Edited by Clarence E. Ridley and Orin F. Nolting. International City Managers' Association, Chicago, Ill. 1932. 274 *pp.* $2.00 *from* THE AMERICAN CITY.

Problems of unemployment relief and ways of reducing expenditures to meet diminishing incomes occupy a large portion of the proceedings of the 18th annual conference of the International City Managers' Association, reported in the Yearbook. Besides containing these papers and the discussion which followed them, the volume includes valuable reference material, such as a summary of council-manager developments during the past year, a city manager directory, and an account of Association business.

Harbor Pollution

Report of the Tri-State Treaty Commission (New York-New Jersey-Connecticut) for Abatement of Pollution of Harbor and Coastal Waters of Metropolitan Area. Submitted February 29, 1932.

A remarkable document presenting the report of the Tri-State Commission to the Legislatures of the states of New York, New Jersey and Connecticut containing the outline of a tri-state compact to control future pollution and to abate existing pollution in the waters of these three states, and including the recommended form of legislation authorizing the appointment of Commissioners for the Interstate Sanitation Commission and the detailed report of the Research and Engineering Committee of the Tri-State Treaty Commission, complete with graphs and tables and a map showing the area affected, has been published as New York State Legislative Document (1932) No. 70.

Individual states have in the past made some gestures towards the lessening of the great load of pollution which reaches the waters of the state interested. The problem of eliminating pollution of the tidal waters has been studied for many years, but no extensive results have been attained. This is because the problem is one requiring cooperative action by all the communities whose sewage now tends to pollute these waters. This Legislative Document No. 70 will stand out as a constructive piece of literature on the control of pollution of tidal and interstate waters.

Sewage Treatment

Two reprints from *Gesundheits-Ingenieur*, published by H. Spitznas, Berlin, Germany: "Die Kläranlage Essen-Rellinghausen und die Auswirkung ihrer letzten Erweiterung" (The Sewage Treatment Plant of Essen-Rellinghausen and the Operation of Its Latest Extension), by Oberingenieur Franz Fries, Essen, 14 pp., Nos. 45 and 46, 1931; "Die Wiederverwendung von städtischem Abwasser" (The Re-Use of City Sewage Effluent), by Dr.-Ing. Karl Imhoff, Ruhrverband, Essen, 8 pp., No. 47, Nov. 21, 1931. Apply to the publisher.)

Two reprints from the *Technisches Gemeindeblatt*, Ruhrverband, Essen, Germany: "Betriebszahlen von Kläranlagen" (Management Statistics of Sewage Treatment Plants), by Dr.-Ing. Mahr, Ruhrverband, Essen, 6 pp., Vol. 34, Nos. 17/18, Sept. 12, 1931; "Fortschritte in der Kenntnis des biochemischen Sauerstoffbedarfs" (Advance in Knowledge of Biochemical Oxygen Demand), by Dr. F. Sierp and F. Fränsemeier, Ruhrverband, Essen, 29 pp., Vol. 34, Nos. 17/18-24, Sept. 12-Dec. 20, 1931. (Apply to the publication, Ruhrverband, Essen, Germany.)

Bridges

A paper on "Economic Proportions and Weights of Modern Highway Cantilever Bridges," by J. A. L. Waddell, consulting engineer, illustrated by a number of graphs, has been reprinted from the *Proceedings* of the American Society of Civil Engineers. 32 pp. (Apply to the author, Waddell & Hardesty, 150 Broadway, New York.)

London—Tomorrow

"Londres . . . Demain."—By George Benoit-Lévy. Published by the author, L'Etoile, Pessicart, Nice, France. 1931. 158 *pp. Illustrated.* $2.00. *Apply to the author.*

A concise presentation (in French) of past, present and future London as to structure, organization, administration, and the legal basis of city and regional planning. There are special studies of housing, transportation and communication, and open spaces. The author is an enthusiastic student of England's progress and especially of the development of Greater London.

Regional Plan

"Mid Northamptonshire Regional Planning Scheme" is a well-illustrated report prepared for the Mid Northamptonshire (England) Regional Planning Committee by Adams, Thompson & Fry, town planning consultants, of London. Among the subjects covered in the eleven sections are Industries and Occupations; Zoning; Communications; Open Spaces; and The Preservation of Amenity. 67 pp. 15 shillings. (Apply to the Hon. Treasurer, Regional Planning Committee, Council Offices, Kettering, England.)

Ground Water

The Journal of the Boston Society of Civil Engineers for January, 1932, contains a paper on "Iron in the Ground Water Supplies of Massachusetts," by Clarence I. Sterling, Jr., Engineering Assistant, Massachusetts Department of Public Health, and John B. Belknap, formerly Engineering Assistant, Massachusetts Department of Public Health, and the ensuing discussion on the paper. 20 pp. Copies of the *Journal* are 50c each. (Apply to the Society, 715 Tremont Temple, Boston, Mass.)

Unemployment

Three recent publications prepared for the President's Organization on Unemployment Relief include: "Subsistence Gardens," a 26-page pamphlet consisting of brief reports on a number of industrial, community and municipal projects which have proved successful in providing food supplies for the unemployed and low-income groups; "Spreading Work—Methods and Plans in Use," by William J. Barrett, Part I of which describes methods, and Part II the plans of individual companies, trade associations, and communities (27 pp.); and "Second Brief Report on Made Work for White-Collar Unemployed" (8 pp.), prepared by the Women's Bureau of the U. S. Department of Labor, presenting the results of a study of plans in effect in various localities to assist the unemployed professional, clerical, business and related groups. (Apply to the President's Organization on Unemployment Relief, 1734 New York Ave., Washington, D. C.)

Aviation

"Our Aviation Program" is a clothbound book of pocket size comprising a series of articles by Charles L. Lawrence, President of the Aeronautical Chamber of Commerce of America, Inc. The articles originally appeared in various of the aeronautical trade papers and discuss the relation of commercial aviation to national defense, the development of air mail service and related topics. 208 pp. $2.50. (Apply to the Chamber, 10 E. 40th St., New York.)

Filtration Plant

An article on "Operating Experiences at the Cambridge, Mass., Filtration Plant," by Melville C. Whipple, Assistant Professor of Sanitary Chemistry, Harvard Engineering School, and Supervising Chemist, Cambridge Water Board; and Fred E. Smith, Chemist, Cambridge Water Purification Works, has been reprinted from the *Journal of the New England Water Works Association*, Vol. XLV, No. 4, and is now available in a 13-page pamphlet. (Apply to Mr. Whipple.)

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Track-type Tractors Road Machinery
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TWENTY	$1450
TWENTY-FIVE	$1900
THIRTY-FIVE	$2400
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British Cities

The Municipal Year Book, 1932.—Edited by Edwin C. Fairchild. The Municipal Journal, Ltd., London, England. 1932. 1,361 *pp.* £1, postpaid.

This annual British storehouse of municipal information appears in its usual substantial form and immense detail, with more pages than last year, and various new features. It contains sections on the local governmental departments and structural units of Great Britain and Ireland, and on Education, Roads and Transport, Electrical Supply, Street Lighting (an entirely new statistical division), Housing, Parks and Open Spaces, Public Cleansing, Water and Gas Supply, Docks and Harbors, Markets and Slaughterhouses, Public Baths and Wash-houses, Public Libraries, Museums and Art Galleries, and Public Assistance; new legislation as to local government is digested, changes in governmental areas are listed, and there are tabulations of officials, salaries and tax rates and lists of municipal, civic and related organizations.

Child Health

"May Day—National Health Day in 1931," a paperbound report of 123 pages, by the American Child Health Association (450 Seventh Ave., New York), presents the activities embodied in state and local programs that were built around the thought, "Community responsibility and cooperation for child health and protection" in 1931. A Foreword by Dr. S. J. Crumbine, General Executive of the Association, and "Celebrating May Day in 1931," by Mrs. Aida Acosta Breckinridge, Director of the Association's Division of Publications and Promotion, precede a list of 95 national organizations and 4 Federal Departments that cooperated in last year's celebration of National Health Day, and the year's radio program. The rest of the report gives "The Story by States—1931." This is concrete material on methods and results. Reports from Hawaii and Porto Rico are included, and a separate one from New York City. (Apply to the Association.)

Sanitary Engineering

The Cincinnati Bureau of Governmental Research has prepared a 50-page mimeographed "Report on the Organization and Administration of the Sanitary Engineering Department" of Hamilton County, Ohio. The report is one of a series of studies of county activities which come under the direct control of the Board of County Commissioners. A number of recommendations are offered, and a number of forms are reproduced. (Apply to the Bureau, 914 Main St., Cincinnati, Ohio.)

Concrete Blocks

"Strength of Concrete Block Pilasters Under Varied Eccentric Loading" was the subject of an investigation made in cooperation with the Common Brick Manufacturers' Association of America by J. R. Shank, Research Professor, and H. D. Foster, Research Engineer, of the Ohio State University Engineering Experiment Station. A bulletin (No. 60) reports the results of tests of seven specimens of concrete building block construction. 35 pp., illustrated. 50c. (Apply to the Engineering Experiment Station, Ohio State University, Columbus, Ohio.)

Traffic Counts

"A Method of Making Short Traffic Counts and Estimating Traffic Circulation in Urban Areas" is described in a bulletin of the University of Wisconsin by Franz A. Aust, Associate Professor of Landscape Design, and H. F. Janda, Professor of Highway Engineering and City Planning, assisted by John R. Campbell and Robert S. Harrison, Barney Link Research Fellows for the years 1924-1928 and 1929-1930 respectively. The research fellowship was established at the University by the Outdoor Advertising Association. 57 pp. (Apply to the University, Madison, Wis.)

Welding

The eleven papers given in a Symposium on Welding at the second Regional Meeting of the American Society for Testing Materials, in Pittsburgh in March, 1931, and the discussion which followed the papers, have been published by the Society in a 152-page report entitled "Symposium on Welding." Five of the papers discuss processes, materials and applications; the others take up inspection and testing of welded products. $1.75, clothbound. (Apply to the Society, 1315 Spruce St., Philadelphia, Pa.)

Public Health

American Public Health Association Year Book, 1931-1932.—Published by the Association, 450 Seventh Ave., New York. Paperbound. 232 *pp. Illustrated.* $1.85.

The first 39 pages of this book present details of the objects, organization, management, membership, and activities of the Association. Then follow committee reports, which deal with sections of the Association's work: Vital Statistics; Public Health Engineering; Industrial Hygiene; Food, Drugs and Nutrition; and Child Hygiene. Under Public Health Engineering are included reports on disaster relief, milk supply, promotion of environmental sanitation, sewage disposal, water supply, and waterways pollution. The Committee on Training and Personnel gives information on civil service regulations as they now affect public health workers; retirement and pension systems; and extension courses in public health, now available to public health workers. In addition, this Committee will publish, in the survey reports to be made during the coming year, information on requirements of engineering colleges in the training of sanitary engineers; and methods of appointment, duties, and tenure of office of state employees, in the field of public health.

Infant Mortality

"Statistical Report of Infant Mortality for 1930 in 874 Cities of the United States" (28 pp.) was published by the American Child Health Association, 450 Seventh Ave., New York, in December, 1931. It presents data from state and local officials and from the Census Bureau's Provisional Summary for cities of over 100,000 Population, received in October, 1931. Of the 874 cities, 860 are in the Birth Registration Area (930 cities); 14 cities outside that Area, but in the Death Registration Area, are included. The tables give infant mortality rates for individual cities from 1925 to 1930 inclusive, and five-year averages for 1916-1920 and 1921-1925; also death rates for most of the cities for 1929 and 1930, with their 1930 population. (Apply to the Association.)

Grade Crossing Standards

The Joint Committee on Grade Crossing Protection of the American Railway Association has published a bulletin (No. 1) on "Railroad Highway Grade Crossing Protection—Recommended Standards," describing, with illustrations, certain standards and methods recommended for general adoption by all railroads in the country. 27 pp. (Apply to the Committee, American Railway Association, 17th and H Streets, N.W., Washington, D. C.)

Purchasing

A second monograph in a Municipal Administration Service series devoted to the problems of small cities has appeared under the title of "Purchasing for Small Cities," by Russell Forbes, Director of the Service, Secretary of the National Municipal League, and an authority on municipal purchasing. It describes the purchasing organization and procedure of several representative small cities, giving constructive criticism in the light of good general practice, in order to assist other cities in their purchasing problems. Emphasis is placed on centralized purchasing. 18 pp. 25c. (Apply to Municipal Administration Service, 261 Broadway, New York.)

Accounting

A "Report on a Survey of the Accounting System of the County of Hamilton, Ohio," prepared by Searle, Miller & Co., public accountants, New York, under the auspices of the Cincinnati Bureau of Municipal Research, was made in 1931 and transmitted by the Bureau to the county officials at Cincinnati, the county-seat (58 pp.) In addition to analyzing the merits and faults of the then existing methods, the consultants prepared an outline for a proposed system of accounting for the county (30 pp.). (Apply to the Bureau, 914 Main St., Cincinnati, Ohio.)

A Traffic Survey

As the first in a series on Traffic Survey Procedure, the Policyholders Service Bureau of the Metropolitan Life Insurance Company has issued "Organizing for a Traffic Survey." This presents the results of a comprehensive study of traffic survey methods and forms conducted by the Highway Research Board of the National Research Council with the cooperation of the Safety Service of the insurance company. 24 pp. (Apply to the Bureau, 1 Madison Ave., New York.)

Public Health Organization

Public Health Organization.—Report of the Committee on Public Health Organization, White House Conference on Child Health and Protection; E. L. Bishop, M. D., Chairman. The Century Co., New York. 1932. XV + 345 *pp.* $3.00 *from* THE AMERICAN CITY.

The mutual relationship and responsibility of the various agencies—rural, city, state, Federal, and non-official—that are working to protect and promote public health is the keynote of this report. It presents the findings of a survey of the essential elements of a health program; of what existing organizations and programs are doing; and what changes are needed to meet the needs. The county, or a union of counties, as a unit of health administration under a special board or commission; the full-time health organization for the city, with well-trained personnel, aided by effective coordination with all agencies that are working for standardization in administrative practice; a central state health organization with full-time, well-trained personnel to carry on administrative and special public health activities, helping to organize and conduct local public health service, and receiving from the Federal Government personnel and money to guarantee adequate standards; and Federal aid to localities through the Public Health Service and the state authorities; these are only suggestions of the framework of recommendations built upon in this thorough study. Many tables show costs, kinds and extent of services, and results of organized public health work. The sections on Non-Official Public Health Organization; The Training of Public Health Personnel; Administration of Child Health Work as Part of Official Health Programs; Relation of Practitioners of Medicine and Dentistry to Health Programs; Health Aspects of Food Control; and Research, round out the extensive survey.

A Year's Progress

The American Year Book, 1931.—*Edited by Albert Bushnell Hart and William M. Schuyler. The American Year Book Corporation, New York.* 1932. XXV + 937 *pp.* $7.50.

This record of significant events, personalities and tendencies in the United States during the last year is again available under the sponsorship of *The New York Times.* In style and arrangement it is like its predecessors; the number of pages is larger than for the preceding four years. Besides being largely concerned with governmental matters, it embraces the fields of economics, science and the humanities. Among topics of municipal interest are: City Politics; Types of Municipal Government; Municipal Functions; Municipal Miscellanies; City Planning; Zoning; City Finance; Property Taxes; Public Service Commissions; Municipal Ownership; Water Supply; Traffic Regulations; Crime and Penal Conditions; Housing Problems; and Education.

Survey of Medical Facilities

The Committee on the Costs of Medical Care has prepared a 23-page abstract of the 340-page report, "A Survey of the Medical Facilities of Vermont," by Allon Peebles, Ph.D., published by the University of Chicago Press ($1.50). The abstract summarizes the findings, which lead to the conclusion that "the evidence is sufficiently clear throughout the report that the people of Vermont are not receiving the medical care which they need and that this is primarily due to the fact that many families cannot make the necessary expenditures." (Apply to the Committee, 910 Seventeenth St., N.W., Washington, D. C.)

Other Reports Received

CINCINNATI, OHIO.—Municipal Activities, 1931. 52 pp.

HENNEPIN COUNTY, MINN.—Financial Statement, 1931. 49 pp.

MINNEAPOLIS, MINN.—Financial Statistics, 1926 to 1932, inclusive. 15 pp.

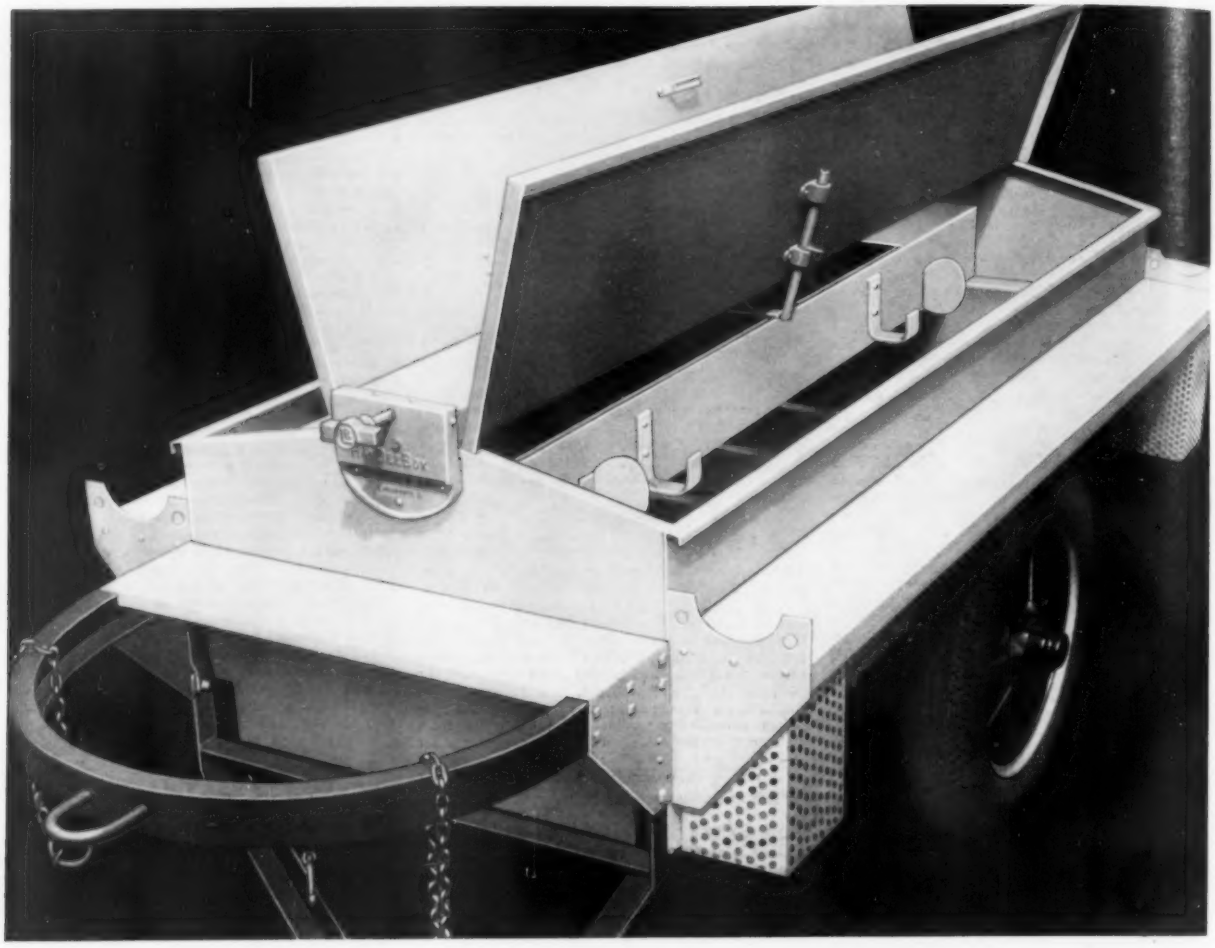
OKLAHOMA CITY, OKLA.—1931 Production Sheet, Chamber of Commerce, and Projects for 1932. 52 pp.

PALO ALTO, CALIF.—Annual Report, Health Department, 1931. 23 pp.

RUHRVERBAND, ESSEN, GERMANY.—Annual Report, 1931. 14 pp.

SALEM, MASS.—Annual Report, Park Department, 1931. 29 pp.

TORONTO, ONT.—Annual Report, Assessment Commissioner, 1931. 43 pp.



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CONVENTIONS—WHEN AND WHERE

(Figures in parentheses following the name of the convention city indicate the estimated attendance other than local)

APRIL 7-8.—SYRACUSE, N. Y. (150)
American Water Works Association—New York Section. Spring meeting. Secretary, E. D. Case, The Pitometer Co., 50 Church Street, New York.

APRIL 11.—NEW YORK. (500)
National Committee on Prisons and Prison Labor. Annual meeting. Secretary, Julia K. Jaffray, 250 West 57th Street, New York.

APRIL 11-15.—STILLWATER, OKLA.
Oklahoma Water and Sewage Conference. Annual conference. Secretary-Treasurer, H. J. Darcy, State Sanitary Engineer, Oklahoma City, Okla.

APRIL 12-13.—URBANA, ILL. (100)
American Water Works Association—Illinois Section. Annual convention. Secretary, Professor J. J. Doland, University of Illinois, Urbana.

APRIL 12-13.—CUMBERLAND, MD. (125)
Maryland-Delaware Water and Sewerage Association. Annual conference. Secretary, A. W. Blohm, 2411 North Charles Street, Baltimore, Md.

APRIL 14-16.—JACKSONVILLE, FLA. (100)
Florida Engineering Society. Annual meeting. Secretary, W. W. Fineren, Gainesville, Fla.

APRIL 15-16.—PHILADELPHIA, PA. (250)
American Academy of Political and Social Science. Annual meeting. Secretary, J. P. Lichtenberger, 3457 Walnut St., West Philadelphia, Pa.

APRIL 22-23.—MACON, GA. (100)
Southern Commercial Secretaries' Association. Annual meeting. Secretary-Treasurer, Karl Lehman, Orange County Chamber of Commerce, Orlando, Fla.

APRIL 25, Week of.—WASHINGTON, D. C.
Bicentennial Conference on the National Capital. Chairman of the Executive Committee, Horace W. Peaslee, 1228 Connecticut Avenue, Washington, D. C.

APRIL 25-30.—RICHMOND, VA.
National Association of State Chambers of Commerce. Convention. Secretary-Treasurer, Major Leroy Hodges, Richmond, Va.

APRIL 25-29.—DETROIT, MICH. (600)
National League of Women Voters. Biennial convention. Executive Secretary, Beatrice H. Marsh, 532 17th Street N. W., Washington, D. C.

APRIL 25.—BOSTON, MASS.
New England Sewage Works Association. Annual meeting. Secretary, F. W. Gilcreas, Room 409, 14 Beacon Street, Boston, Mass.

APRIL 27-29.—WASHINGTON, D. C. (200)
American Institute of Architects. Annual convention. Secretary, Frank C. Baldwin, The Octagon, Washington, D. C.

APRIL 28-29.—WASHINGTON, D. C.
American Road Builders' Association. Annual meeting. Engineer-Director, Charles M. Upham, National Press Building, Washington, D. C.

MAY 1.—BRIDGEPORT, CONN.
Connecticut Chamber of Commerce, Inc. Annual meeting. Executive Vice-President, H. E. Hasty, 410 Asylum Street, Hartford, Conn.

MAY 2-6.—MEMPHIS, TENN. (1,500)
American Water Works Association. Annual convention. Secretary, Beekman C. Little, 29 West 39th Street, New York.

MAY 7.—PARIS, FRANCE. (150)
Association of Garden Cities of France. International Association of Lineal Cities. Annual meeting. Director, Georges Benoit-Levy, "L'Etoile," 25 Rue Rennequin, Pessicart, Nice, France.

MAY 9-11.—SAN ANTONIO, TEXAS.
City Marshals and Chiefs of Police Union of Texas. Annual convention. Secretary, George A. Smith, P. O. Box 299, Dallas, Texas.

MAY 9-12.—ATLANTIC CITY, N. J.
National Fire Protection Association. Annual meeting. Managing Director, Franklin H. Wentworth, 60 Batterymarch Street, Boston, Mass.

MAY 12-14.—WENATCHEE, WASH. (115)
American Water Works Association—Pacific Northwest Section. Annual meeting. Secretary, Ernest C. Willard, 720 Corbett Bldg., Portland, Ore.

MAY 12-14.—PHILADELPHIA, PA. (500)
National Probation Association. Annual convention. General Secretary, Charles L. Chute, 450 Seventh Avenue, New York.

MAY 13-15.—ATLANTIC CITY, N. J. (150)
Association of Community Chests and Councils. Annual meeting. Executive Director, Allen T. Burns, 1815 Graybar Building, New York.

MAY 13-14.—ROCKFORD, ILL.
Central States Sewage Works Association. Secretary-Treasurer, G. H. Radebaugh, Urbana and Champaign Sanitary District, Urbana, Ill.

MAY 16-18.—PHILADELPHIA, PA.
American Association of Public Welfare Officials. Annual conference to be held with National Conference of Social Work (May 15-21). Director, Frank Bane, 1800 E Street N. W., Washington, D. C.

MAY 16-20.—SAN FRANCISCO, CALIF. (3,000)
Chamber of Commerce of the United States of America. Annual meeting. Secretary, D. A. Skinner, 1615 H Street, N. W., Washington, D. C.

MAY 23, WEEK OF.—LONDON, ENGLAND.
International Congress of Local Authorities. (Followed by tours in England and Scotland during the next two weeks.) General Secretary, E. Vinck, Rue de la Regence, Brussels, Belgium. General Secretary of the British Organization, G. Montagu Harris, Ministry of Health, Whitehall, London, S. W. 1. American inquiries may be addressed to Luther Gulick, Director, National Institute of Public Administration, 302 East 35th Street, New York.

MAY 24-27.—LOS ANGELES, CALIF. (200)
National Association of Public School Business Officials. Annual meeting. Secretary, John S. Mount, Inspector of Accounts, State Department of Public Instruction, Trenton, N. J.

MAY 25-27.—TORONTO, ONT. (500)
Canadian Public Health Association. Annual meeting. General Secretary, Dr. J. T. Phair, Spadina House, Toronto, Ont.

MAY 25-27.—MENASHA, WIS.
League of Wisconsin Municipalities. Annual convention. Secretary, Frederick MacMillin, 114 North Carroll Street, Madison, Wis.

MAY 26.—NEW YORK.
National Board of Fire Underwriters. Annual meeting. General Manager, W. E. Mallalieu, 85 John Street, New York.

MAY 27-28.—WILMINGTON, DEL. (300)
Eastern Association of Fier Chiefs. Annual convention. Secretary, F. E. Soule, Coatesville, Pa.

JUNE 6-9.—DETROIT, MICH. (1,000)
National Association of Purchasing Agents. Annual convention and Informashow. Secretary, G. A. Renard, 11 Park Place, New York.

JUNE 6-11.—CAMBRIDGE, MASS.
New England Water Works Association. Water Works School. Secretary, Frank J. Gifford, 715 Tremont Temple, Boston, Mass.

JUNE 7-9.—WASHINGTON, D. C.
International Association of Comptrollers and Accounting Officers. Annual meeting. Secretary, Carl H. Chatters, 816 Fidelity Trust Building, Detroit, Mich.

JUNE 8-10.—RED WING, MINN. (500)
League of Minnesota Municipalities. Annual convention. Executive Secretary, Morris B. Lambie, Director of Extension Division, University of Minnesota, Minneapolis, Minn.

JUNE 13-16.—LOS ANGELES, CALIF.
National Conference on City Planning. Secretary, Flavel Shurtleff, 130 E. 22d St., New York.

JUNE 13-15.—DALLAS, TEXAS. (300)
League of Texas Municipalities. Annual convention. Executive Secretary, Harvey W. Draper, 319 Kress Building, Houston, Texas.

JUNE 14-16.—PORTLAND, ORE. (500)
International Association of Chiefs of Police. Annual convention. Secretary, George Black, Chief of Police, Wilmington, Del.

JUNE 20-24.—CLEVELAND, OHIO. (550)
American Institute of Electrical Engineers. Annual summer convention. Assistant Secretary, H. H. Henline, 33 West 39th Street, New York.

JUNE 20-24.—ATLANTIC CITY, N. J.
American Society for Testing Materials. Annual meeting. Secretary-Treasurer, C. L. Warwick, 1315 Spruce Street, Philadelphia, Pa.

JUNE 20-22.—STATE COLLEGE, PA. (200)
Pennsylvania Water Works Operators' Association. Annual convention. Secretary-Treasurer, I. M. Glace, 536 South Office Building, State Capitol, Harrisburg, Pa.

JUNE 21-24.—NEWPORT, R. I. (700)
New England Association of Fire Chiefs. Annual convention. Secretary-Treasurer, John W. O'Hearn, 99 Main Street, Watertown, 72, Mass.

JUNE 22-24.—STATE COLLEGE, PA. (140)
Pennsylvania Sewage Works Association. Secretary, L. D. Matter, Kirby Health Center, Wilkes-Barre, Pa.

JUNE 27-JULY 1.—LAKE OF BAYS, ONT. (500)
American Society of Mechanical Engineers. Semi-annual meeting. Secretary, C. W. Rice, 29 West 39th Street, New York.

JUNE 27-JULY 2.—ATLANTIC CITY, N. J. (12,000)
National Education Association of the United States. Annual meeting. Secretary, J. W. Crabtree, 1201 16th Street N. W., Washington, D. C.

JULY 6-9.—YELLOWSTONE PARK.
American Society of Civil Engineers. Annual convention. Secretary, George T. Seabury, 33 West 39th Street, New York.

JULY 23-29.—LOS ANGELES, CALIF.
International Recreation Congress and annual meeting of the National Recreation Association. First International Congress. Administrative Secretary, T. E. Rivers, 315 Fourth Ave., New York.

AUGUST 26-27.—ROCHESTER, N. Y. (200)
National Shade Tree Conference. Annual convention. Secretary-Treasurer, Dr. Rush P. Marshall, Yale University, New Haven, Conn.

SEPTEMBER, 13-16.—ST. LOUIS, MO.
International Association of Municipal Electricians. Annual convention. Secretary, W. H. Harth, Columbia, S. C.

SEPTEMBER 18, WEEK OF.—WASHINGTON, D. C.
American Civic Association, Inc. American Institute of Park Executives. Annual meetings. Executive Secretary of the Association, Harlean James, Union Trust Building, Washington, D. C. Executive Secretary of the Institute, William H. Walker, 224 Wakewa Avenue, South Bend, Ind.
The National Conference on Government (listed below) will meet in conjunction with these two organizations.

SEPTEMBER 18, WEEK OF.—WASHINGTON, D. C.
National Conference on Government, a combination of the annual meetings of the following organizations: *National Municipal League*, Secretary, Russell Forbes, 261 Broadway, New York; *Proportional Representation League*, Executive Secretary, George H. Hallett, Jr., 311 South Juniper Street, Philadelphia, Pa.; *National Association of Civic Secretaries*, Secretary, H. Marie Dermitt, Hotel William Penn, Pittsburgh, Pa.; *American Legislators' Association*, Director, Hon. Henry W. Toll, Equitable Building, Denver, Colo.

SEPTEMBER 29-OCTOBER 1.—PITTSBURGH, PA. (150)
International Association of Public Works Officials. Annual convention. Secretary, A. M. Anderson, 100 North LaSalle Street, Chicago, Ill.

OCTOBER 3-7.—WASHINGTON, D. C. (5,000)
National Safety Council. Annual congress. Managing Director, W. H. Cameron, 20 North Wacker Drive, Chicago, Ill.

OCTOBER 17-20.—FORT WORTH, TEXAS. (300)
Southwest Water Works Association. Annual convention. Secretary-Treasurer, Lewis A. Quigley, Fort Worth, Texas.

OCTOBER 18-21.—SAN DIEGO, CALIF. (800)
International Association of Fire Chiefs. Annual convention. Secretary, James J. Mulcahey, Yonkers, N. Y.

OCTOBER 23-26.—MEMPHIS, TENN.
National Association of Commercial Organization Secretaries. Annual convention. Secretary-Treasurer, J. H. Hott, Chamber of Commerce, Fort Worth, Texas.

OCTOBER 31-NOVEMBER 2.—WINSTON-SALEM, N. C.
American Water Works Association—North Carolina Section. Annual meeting. Secretary-Treasurer, Professor H. G. Baity, Department of Sanitary and Municipal Engineering, University of North Carolina, Chapel Hill, N. C.

NOVEMBER 7-11.—NEW ORLEANS, LA. (200)
American Society of Municipal Engineers. Annual convention. Secretary, C. W. S. Sammelman, 4359 Lindell Boulevard, St. Louis, Mo.

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NEWS AND ILLUSTRATIONS

Items of Interest to City, Town and County Officials, and Others Concerned with the Economical Construction and Efficient Operation of Public Improvement Undertakings

A New Resilient Road Guard

The Resiliflex road guard made by the National Traffic Guard Co., 215 Moreland Avenue, N. E. Atlanta, Ga., has standard panel lengths and post spacing of 16 feet with 8-foot panel lengths at the ends of each installation. The road guard proper is made of rust-resisting metal, galvanized, and in service is usually painted white, to present a maximum degree of visibility. The posts may be of plain or treated timber, or reinforced concrete or steel. To develop the maximum strength of the road guard, the manufacturers recommend that wood posts be not less than 6 x 8 inches and the concrete not less than 8 x 8.

In starting the erection of these metal stands with clips at the end, the last section is anchored securely. The first operation is digging the hole for the post, which is set and thoroughly tamped. The spring section is loosely bolted to the post and then the flexible rail attached to it. Following this, the spring is bolted tightly to the post, creating tension in the rail member. A bar 10 or 12 feet long with a pull hook is used to draw the spring to the face of the post. After erection, the entire rail, springs, and fittings are painted, usually white, but as the rail and all its parts are galvanized, the surfaces should be etched before painting unless they have been previously etched by exposure to the atmosphere.

The majority of contacts by motor vehicles do not damage any part of the rail to such extent that replacements are necessary. Usually the only attention necessary is to re-align the posts and repaint scratched rail surfaces. If a rail section is dented by a hub, it can usually be straightened by using a hammer on the back of the rail without removing it. In extreme cases where a part may require replacement, this can be done by using a set of repair clamps. Even extreme rail distortion can generally be removed by placing the face of the rail on the pavement and hammering it, after which the rail can again be placed in service.

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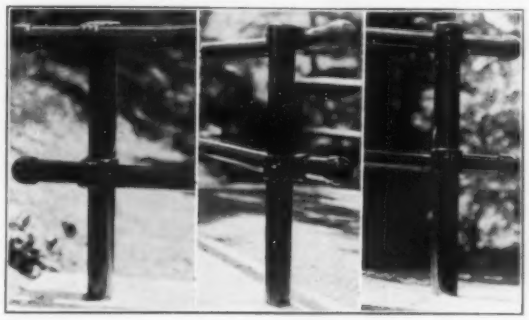


OFFSET PIPE RAILING FITTINGS USED EFFECTIVELY

Offset Pipe Railings

The advantages of offset railing construction for park fences, bridges, underpasses, etc., are the possibilities of developing the entire strength of the pipe; as its cross-section is not diminished by thread cutting, it is more durable, for the threaded portion, which makes a weak point for corrosion, is eliminated and there is no question of right and left threads. The Malleable Iron Fittings Co., Pole Hardware Department, Branford, Conn., manufacturers of offset pipe railing fittings, states that the offset fittings for a normal job cost less than corresponding threaded fittings. A pipe for the post may be delivered to the location cut to length, and pipe for the rails may be random lengths usually obtainable at mills at reduced prices.

Offset pipe railing fittings are of the double-collar type, one collar encircling the post and the other encircling the rail, so arranged that the post is one continuous piece behind the rails. The openings for the post and the rail are large enough for easy slip fit with standard pipe, and the fittings are secured to the pipe with two concealed set screws. The rails never end in the pipe fitting except at corner posts, but are joined in unthreaded couplings with set screws and always project beyond the end post, terminating in end caps.

There are several types of post settings. One has a base flange heavier than the normal threaded flange and is anchored down by four expansion bolts or anchor bolts to a template in the concrete. Another is the dowel type settings, in which a massive malleable iron dowel, having horizontal corrugations, is set in the concrete at the desired location with its upper third projecting. The post then fits snugly over the dowel, but within a smaller base flange. A set screw in the base flange then secures the flange, post and dowel as one rigid unit. A post mount type of setting has four pieces, bolted into one unit around the post, with eight clamping bolts, and is anchored by four expansion bolts set to template.

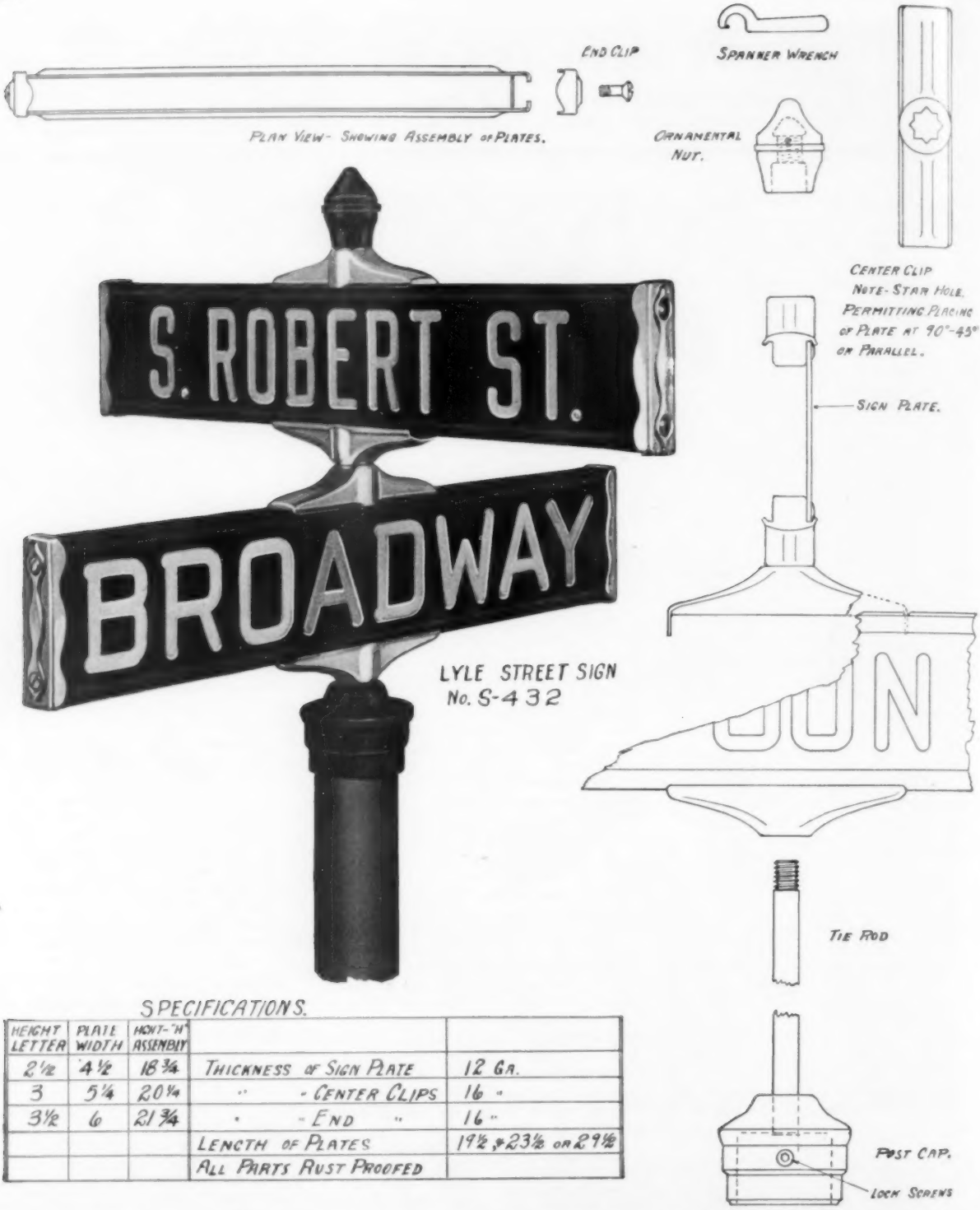
A Straight or Leaning Wheel Grader

The new Gledhill grader, designed for efficiency, durability and ease of operation, has recently been announced by the Gledhill Road Machinery Co., Galion, Ohio. These graders are made in a range of sizes, with straight or leaning wheels, with or without scarifier, in twelve different models.

According to the manufacturer, the question of whether straight or leaning wheels are better for general road grading is an open one, and these graders are therefore made in both the straight-axle and the leaning-wheel type. In the latter, the adjustment of the leaning wheels has been made easy by the use of the power of the grader itself, taken from the wheels. At the same time, an automatic pivoting of the axle to provide the necessary alignment for efficient work takes place.

By means of a hollow king-pin and two sets of beveled gears, the steering gear on these graders is made to operate easily from the driver's platform, with the tongue in any position, even with it fully reversed and pointing to the rear. This permits turning short on narrow roads. A high-lift feature makes possible the use of the moldboard as a banksloper without any special attachments, and counterbalancing springs make the raising of the moldboard easy. The moldboard shifts endwise up to 10 inches on the knees by a new device, and the side-shift, operating by means of a machine-cut worm and gear mounted on Timken bearings, offers a wide range of adjustability. It is hung by sturdy knees on a complete circle suspended on links with ball-and-socket joints, and is curved to roll the earth.

The frame in both the straight and leaning wheel types can be shifted from side to side on the rear axle. All operating levers and wheels are within convenient reach of the operator from a solid platform, which permits a complete



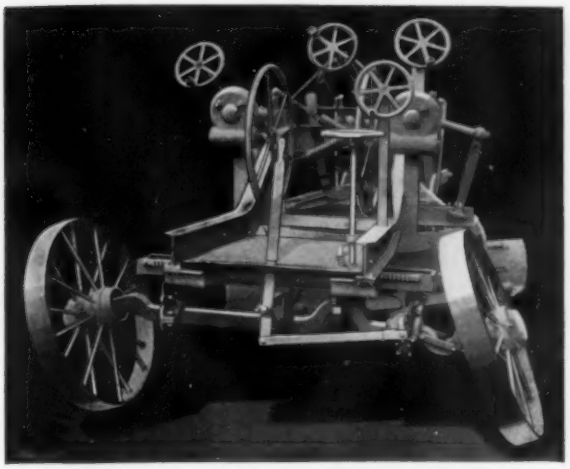
SPECIFICATIONS.

HEIGHT LETTER	PLATE WIDTH	HOLT-"H" ASSEMBLY		
2½	4½	18¾	THICKNESS OF SIGN PLATE	12 GA.
3	5¼	20¼	" - CENTER CLIPS	16 "
3½	6	21¾	" - END "	16 "
			LENGTH OF PLATES	19½, 23½ OR 29½
			ALL PARTS RUST PROOFED	

THE new style Lyle Street Sign presents an unusual combination of beauty, legibility and endurance. The letters are carved into rust-resisting 12-gauge ingot iron and are immune to the deteriorating effects of frost, rain, sun or vandalism. The rust-proof center and end clips which are new in Lyle Construction add to the distinctive appearance of the sign and at the same time act as reenforcing agents in forming a solid, practically indestructible assembled unit.

Study the engineering features of this new Lyle Assembly—consider the endless years of service it will render. Then you will see in this handsome sign a product of superlative merit in which to invest the street-sign funds of your town.

LYLE SIGNS, INC., MINNEAPOLIS



THE GLEDHILL LEANING-WHEEL GRADER

view of the work. Rubber tires can be supplied if required.

A Power Putting-Green Mower

After an entire season of practical tests on many courses, the Worthington Mower Co., Stroudsburg, Pa., has announced the Worthington Overgreen Scout mower for putting-green service. It differs from the Chieftain Overgreen only in that it has roller mower units instead of the high wheels of the Chieftain. The manufacturer guarantees that the machine will mow any putting green in one-fifth the time required by hand mowers and leave as smooth and uniform a cut as any hand or power mower.

An entirely novel feature of the roller unit of the Overgreen is the arrangement for adjusting the lengths of cut, permitting this important operation to be accomplished almost instantly by the fingers alone. The three units on the Overgreen are changed by this device from one length of cut to another, accurately and in agreement, and without lifting or handling the unit in any way.

A Plant for Coating Aggregate with Bitumen

The increasing demand for a bituminous paving mixer to be used for the surfacing and construction of secondary roads and for resurfacing old roads of other types led to the development of Saturmix equipment by the Saturmix Corporation, Wooster, Ohio. The Saturmix machine consists of a framework supporting an emulsion tank, a storage bin, where a perforated basket is so arranged as to be capable of receiving aggregate while immersed in the emulsion tank, and then of being so rotated as to slowly discharge the aggregate from the basket into the storage bin. The frame is so built as to readily permit transportation from place to place, and the over-all width does not exceed that allowable for vehicles on highways.

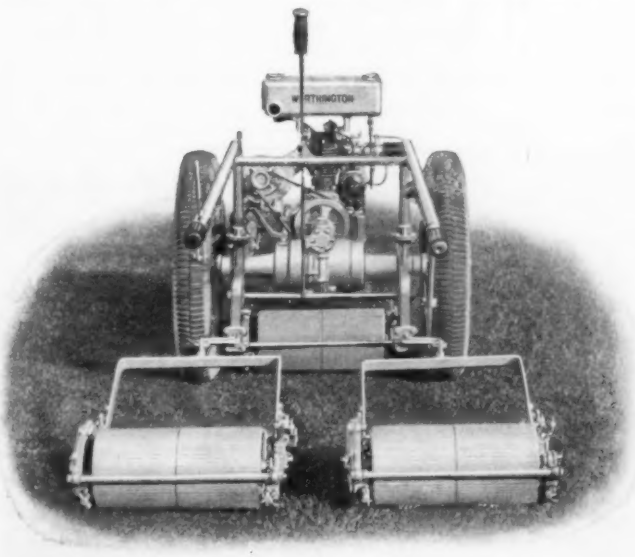
The emulsion tank is large enough to accommodate the emulsion basket, which forms a tight seal around the top when in position to receive the aggregate to be coated. A sludge trough is arranged at the bottom of the tank, with a suitable opening to permit the removal of any material which passes through the basket or which gets into the tank in any other manner. Steam coils are arranged in the tank for use in the event that it is desirable to employ a cut-back asphalt or tar as a binder instead of emulsion, or if operation is desirable during freezing weather.

The storage bin holds approximately 6 tons of material and is arranged with a chute gate at its lower end, operated by means of a lever with suitable counterweight. This bin is provided with a drainage trough underneath the hinge point of the gate to receive the drainage of any excess binding material which

A COMPLETE SATURMIX PLANT

may be brought over with the coated aggregate.

The immersion basket is constructed of perforated sheet steel with perforated double partitions permitting the binding material to have ready access to the aggregate to be coated. The immersion basket is rotated by a bull-wheel mounted on one end of the shaft which supports the basket. The bull-wheel is driven by ropes actuated by a friction hoist mechanism. The pump required for placing the bituminous binder in the emulsion tank is of the open impeller centrifugal type, with large openings to allow for the passage of any foreign substance that may get into the piping system. The unit is powered with a four-cylinder gasoline engine, arranged with roller chain drive to the pump and to the hoisting mechanism.



THE WORTHINGTON OVERGREEN SCOUT MOWER

New Officers of Keystone Driller Co.

Keystone Driller Co., of Beaver Falls, Pa., has announced that at a special meeting of the Board of Directors recently the following officers were elected: President, L. M. Johnston, of Pittsburgh, formerly Vice-President of A. M. Byers Co.; Vice-President, E. C. Rebeske, President of the First National Bank of Beaver Falls, formerly Treasurer of the Union Drawn Steel Co.; Secretary, R. R. Downie; and Treasurer, C. T. Smith. The last two officers were re-elected.

Sittin' pretty

Speaking of sittin' pretty did you ever notice how those old heads at the water works game go about buying hydrants and valves?

In doing a bit of heavy thinking *then* they sidestep a lot of work and worry *later*. Why, they say, put up with finicky valves . . . valves so danged contrary the stem jams unless you screw both bolts down exactly even.

Or the kind that brings real grief . . . the valves that *leak*. Gosh, men, a *leakless* valve (with pressure applied equally at four separate points) doesn't cost a red more. All you have to do is make sure they're *Columbians!* You're insisting on synchro-mesh and free wheeling why not look for improvements when you place that next order for fire hydrants and valves. If you look in the *right* place you'll find them!

Columbian
IRON WORKS
CHATTANOOGA, TENNESSEE

PAGE FENCE IN 4 METALS

***CORRECT* STYLE**
***CORRECT* METAL**
BOTH ARE IMPORTANT IN FENCING

• In selecting a fence these two points are most important—appearance and endurance. Appearance depends largely on background surroundings but endurance depends *solely* on the metal selected. To make fence last longer, Page offers these four fine metals:

1 Page "*Alcoa*" Aluminum
2 Page Armco Ingot Iron
3 Page Copper-Bearing Steel
4 Page Highland Wrought Iron

• We will gladly recommend the particular metal that will give best service in your locality. No obligation. Page Fence Association, 520 No. Michigan Ave., Dept. A14, Chicago, Ill.

PAGE FENCE
CHAIN LINK OR ORNAMENTAL WROUGHT IRON

—WHERE AM I, MISTER?—

How often is that question asked in YOUR city, not only by strangers in town, but by your own citizens living in other sections? And all because your streets are not properly marked!

Our latest development in street signs will allow you to erect them on every corner.

Write for particulars

A four-way porcelain enamel sign, in aluminum holder, ready to mount on 2-in. post, complete, in reasonable quantities 6.50

—ROCHESTER STREET SIGNAL CO.—
396 Platt Street Rochester, N. Y.

"EARLY SIGNS"

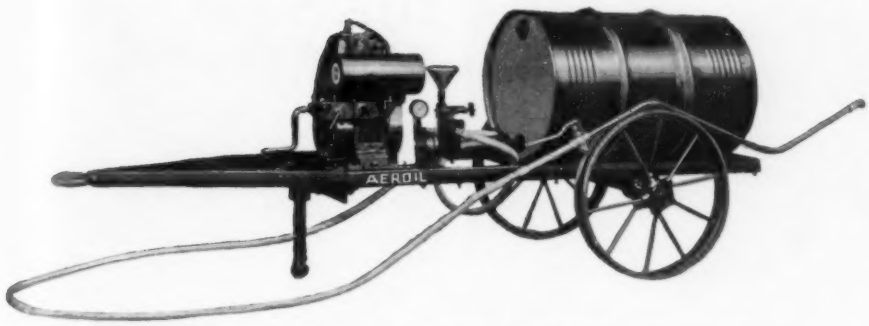
THE ORIGINAL AND MOST POPULAR

IN USE IN OVER 400 CITIES AND TOWNS

Porcelain enamel plates are guaranteed for 10 years against fading or chipping.
Certified malleable iron frames and staff. Adjustable to any angle. *Agents Wanted*

SEND FOR SAMPLE HEAD FOR COMPARISON

TRAFFIC AND STREET SIGN CO.
86 Foundry Street Newark, N. J.



THE AEROIL HAND TRUCK FOR APPLYING EMULSIFIED ASPHALT BY POWER SPRAY DIRECT FROM THE DRUM

A Power Spray Machine for Penetration or Surface Treatment

A compact and easily portable spray machine for handling bituminous material, on which the engine and pump unit are mounted on a substantial angle iron frame, has been placed on the market by the Aeroil Burner Co., Inc., Park Avenue at 13th Street, West New York, N. J. Two 24-inch roller-bearing wide rim steel wheels are provided to move the machine around, and the pump unit is protected, when not in use, by galvanized steel covers equipped with two padlocks. The drum of bituminous material is mounted direct on the unit, obviating the necessity of pumping the material from the drum into a tank on the machine. The spray is delivered at a pressure from 20 to 70 pounds at the gun, while no pressure is applied to the barrel or drum.

A gasoline engine is direct-connected to a geared pump unit and is equipped with a priming funnel, pressure gage, 2½ feet of supply hose from the drum to the pump unit, a 15-foot length of ¾-inch spray hose, a 4-foot spray gun with bronze nozzle, and a special lever type valve which controls the spray and permits the operator to instantly shut off the flow of liquid by merely releasing the pressure on the handle. The manufacturer guarantees that the valve will not stick.

A Highway Mower That Covers 50 Miles a Day

A large-capacity mower which is mounted on a pair of rubber-tired wheels and which can be attached to any truck for trimming weeds and grass along the shoulders of highways and also for cutting grass in ditches has been announced by the Toro Manufacturing Co., Minneapolis, Minn. The Toro highway mower is an independent mowing outfit consisting of a power-driven sickle with a cutter bar attached to a steel frame carrying the motor, all mounted on pneumatic-tired wheels in tandem. The mower is attached to any make or type of truck by means of a universal coupling and a telescope pipe of various lengths. Guide chains attached to the front and rear maintain the correct relation of the mower to the truck. No alterations are necessary on the truck chassis, and the whole apparatus can be easily disconnected.

The sickle bar is driven by a single-cylinder, air-cooled, four-cycle motor and operates at the rate of 750 r.p.m. The mower will cut through weeds easily and without frequent jamming. Two men are required to do the cutting; one man drives the truck, and the other rides on the truck body to control the raising of the sickle bar by means of a worm-gear lifting device and cable. As the mower cuts along the ditch, the operator raises and lowers the bar when passing over culverts or other obstructions. No particular skill is necessary, and only diligence on the part of both the driver and the operator.

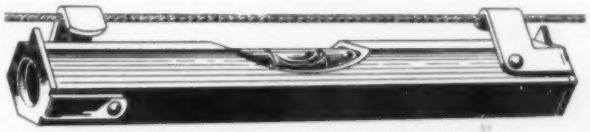
Ballin Joins Nordberg Diesel Staff

The Nordberg Manufacturing Co., Milwaukee, Wis., has announced the affiliation of A. E. Ballin as Vice-President in charge of sales and engineering. Mr. Ballin was formerly President of the McIntosh & Seymour Corporation.

A Line and Surface Level

Contractors and municipal engineers frequently endeavor to use carpenter's levels in laying out lines and levels with strings and cord. The weight of the level causes all kinds of inaccuracy. Sand's Level & Tool Co., 8631 Gratiot Avenue, Detroit, Mich., has developed a 3-inch line and surface level, No. 555, which weighs only a half-ounce, is easily carried in the pocket, and is sturdy and effective. It is made of hard drawn aluminum tubing with nickel silver end pieces, including a sturdy hook at each end with a properly spaced lug riveted to the body of the level. This prevents the level from falling off the line.

The bottom surface is made perfectly flat for accurate surface leveling. The fluid is slightly yellow, consisting of alcohol and a drop of ether.



THE NEW NO. 555 SAND'S LINE AND SURFACE LEVEL

White and Chausse Merge

White Manufacturing Co., Elkhart, Ind., has announced that in the future it will conduct the business of the Chausse Oil Burner Co., also of Elkhart. Development of a complete new line of bituminous road-building machinery by White Manufacturing Co. engineers has influenced the decision to market this equipment hereafter as Chausse-White products. This line consists of bituminous paving mixers for hot and cold laying, rotating aggregate dryers, and complete premixing plants, in addition to the Chausse street-repair machines, tar kettles and kerosene torches.

THE TORO HIGHWAY MOWER

HERE IS SMOOTHER CUTTING AT SMALLER COST

THE NEW IDEAL "MAJESTICS"

To the world's most complete line of mowers, Ideal adds the new "Majestics"—finer, smoother-cutting models, with power-driven reel. In two sizes—22 and 30-inch cut. They have that great reserve power necessary for getting the maximum amount of smooth cutting per day.

They can be slowed down to almost a standstill without stalling. Then—open them up—and they accelerate in a flash to a fast pace. Operation is easy—untiring.

The great Ideal line of power mowers now comprises more than six models, including four roller types, two wheel types. Weed trimmer and rubber tires available for wheel types.

SMALL COST—
BIG CAPACITY

The new Junior Triplex licks the high-cost problem on intricate, big-capacity cutting. Can pay for itself in time and labor saved. Here are the advantages: Low cost, 10-hp. engine. 3 big Bulldog cutting units. 25 acres per day.

IDEAL
GRASS CUTTING EQUIPMENT

IDEAL POWER LAWN MOWER CO., 400 Kalamazoo St., Lansing, Mich.

FACTORY BRANCHES

237 Lafayette St. New York City
413 W. Chicago Ave. Chicago, Ill.
161 Vester St. Ferndale (Detroit) Mich.

DEALERS IN ALL PRINCIPAL CITIES

Buy for TOMORROW as well as TODAY!

JOSLIN Street Signs are constructed of only the best materials in generous proportions, and then solidly assembled. They are extremely well finished and are guaranteed to be weather-proof. Pure aluminum embossed letters, background of Dupont Duco three-coat finish on heavy gauge galvannealed rust-resisting steel. Gracefully designed.

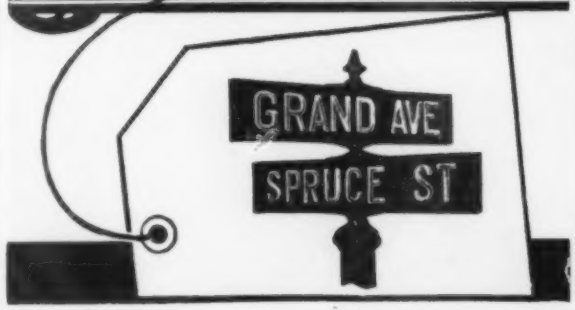
Guaranteed for ten years for legibility, readability and against any defects in materials or workmanship.

Sales agents who are reliable and can produce are desired for a limited number of territories now open.

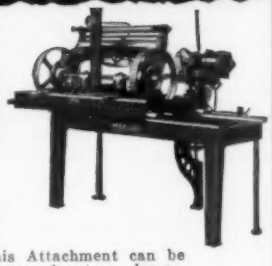
Write for profitable proposition

A. D. JOSLIN MANUFACTURING CO.
MERCHANDISE MART CHICAGO, ILL.

JOSLIN
Street Signs



THE PEERLESS MOWER SHARPENER !



The New Model D Peerless Mower Sharpener grinds all types of power-driven, fairway, putting green and hand mowers without removing mower wheels or reel knives. Carriage has travel of 42 inches. Grinds with amazing speed and accuracy. 6-inch grinding wheel driven by ½-hp. motor and V belt. Very quiet running.

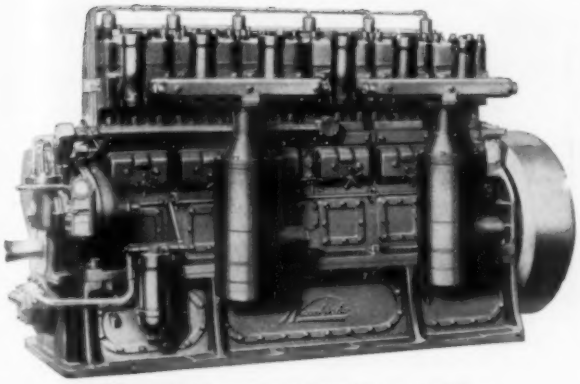
Reconditioner Attachment furnished at an additional price for "lapping in" putting green mowers with emery paste. This Attachment can be quickly clamped to the Sharpener by two clamps. Write for Catalog.

THE FATE-ROOT-HEATH COMPANY
132-168 BELL STREET, PLYMOUTH, OHIO

PLAY DEVICES FOR YOUR PLAYGROUNDS and PARKS

If you are interested in installing some park, pool, or playground equipment that is superior in design and quality send for this catalog which illustrates a complete line of popular playground devices.

AMERICAN PLAYGROUND DEVICE CO.
DEPT. C
ANDERSON, INDIANA



THE WAUKESHA 200-HORSEPOWER DIESEL ENGINE

A New Six-Cylinder Diesel Engine

A 7¾ x 8½-inch full diesel engine of 180 to 200 horsepower, which has all the essentials of the four-cylinder diesel engine, has been announced by the Waukesha Motor Co., Waukesha, Wis. The new Waukesha unit is a four-cycle, solid injection unit with a Bosch injection pump and fuel system, a special compressed air starting system, and the Waukesha ell head, high turbulence combustion chamber. Since engines of this type must be started by mechanical means, the gasoline auxiliary starting system that was used on the four-cylinder engine a year ago is of no practical advantage and is omitted. The present six-cylinder engine is complete with fuel, air and lubrication filters, and all necessary attachments for placing it in immediate operation.

This diesel Great Six Model 6-DLK is a heavy-duty unit for both stationary and semi-portable work, and for such portable uses as are common in construction work. It is adapted to small municipal lighting and pumping plants and to dredge and pump drive. The design is simple. It is of the airless injection, compression ignition type, with no pre-combustion chambers or other modifications of the true diesel principle. The manufacturer has made a definite endeavor to employ the fewest possible number of parts, all fully enclosed, but thoroughly accessible through the large inspection doors, which permit both inspection and adjustment of all the major moving parts within the engine.

In addition to contributing the simplicity of direct-acting valve mechanism, the ell head combustion chamber of the Waukesha diesel engine makes possible the control of flame travel by directly controlling the turbulence of the mixture. This results in greater fuel economy, greater smoothness and greater freedom from carbon at all loads and speeds. It also makes it possible to operate at various speeds and loads without any change of the injection timing.

A Robert Bosch fuel pump with the necessary special features to suit the Waukesha engine has been developed to make possible the many economies afforded through specialized quantity production. Used in combination with a special form of Bosch injection valve, it is possible to burn any commercial diesel engine oil ranging in gravity between 18 and 40 degrees Baume, having a viscosity of 40-75 seconds Saybolt at 100 degrees Fahrenheit.

A compressed air starter employing special pneumatic relay valves to admit air to each cylinder from the main air header insures a dependable start even with moderate air pressures. Clutches, stub shafts, and accessories can be applied for practically any commercial drive, coupling, belt, chain or gear.

Portable Crushing and Screening Plants to Produce 1,000 Yards per Day

Increased capacity with ready portability and production up to 1,000 yards per day feature the two new Western portable crushing and screening plants announced by the Austin-Western Road Machinery Co., 400 N. Michigan Avenue, Chicago, Ill. The No. 100 and No. 90 plants have an over-all height under 12 feet, and an over-all length exclusive of the pit conveyor under 26 feet; and the width exclusive of the delivery conveyor is 10 feet.

This new unit is designed to accommodate a single crusher or both primary and reduction crushers. The two-crusher plant is known as the No. 100, and the single crusher plant is known as the No. 90. A two-deck screen is used in the larger plant, and a single-deck screen in the smaller. With these exceptions, the two are identical. When moving from one location to another it is necessary only to disconnect the pit and delivery conveyors. This operation is simplified as there is no projection below the ground level at any time; therefore it is not necessary to dig a pit for the lower end of the delivery conveyor. The bucket carrier which returns the crushed material to the screen also operates entirely above the ground line.

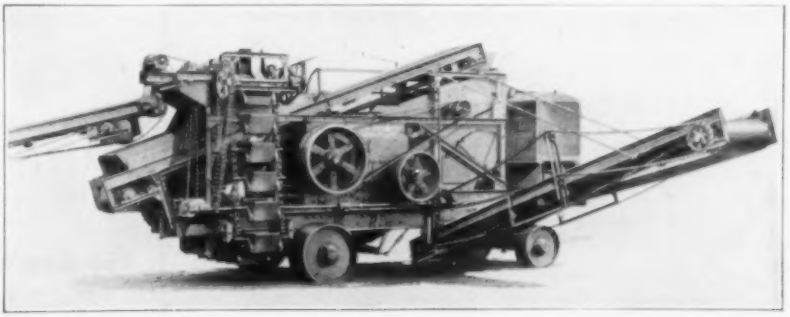
The pit conveyor with a 24-inch belt delivers the material to the plant conveyor, which in turn delivers it to the gyrating screen. Oversize passes along the screen to the crushers, or crusher, while the undersize drops through the screen into the 2½-yard storage hopper, which is built into the plant. After being crushed, the oversize is conveyed to the bucket carrier which runs over and around one end of the plant. Provision is made for removing excess sand or dust by placing a short section of sand screen over the upper end of the gyrating screen. The fine material drops through this section to a built-in discharge chute, diverting it either to the ground or to a special sand removal conveyor. Where it is desired to load the finished product directly into trucks, a 20-foot delivery conveyor is furnished. The 2½-yard storage hopper allows the material to accumulate while the loaded truck goes away and an empty one takes its place, thus saving time.

Where it is desired to load the trucks from the storage bin, a 48-foot delivery conveyor is furnished. If but one size of finished product is wanted, a one-compartment bin is used. If more than one size of product is wanted, a sizing screen is mounted on the bin, and the bin itself is divided into two or more compartments.

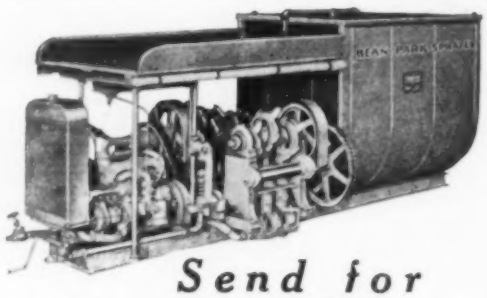
The Western No. 940 primary crusher with its 9 x 40-inch jaw opening, and the No. 440 reduction crusher with its 4 x 40-inch opening, are of the overhead eccentric type. These crushers use extra-large SKF self-aligning roller bearings, which prevent damage to the shaft and bearings from the deflection which is always present in crusher shafts under load.

American-LaFrance to Sell Fire Hose

Announcement that the American-LaFrance and Foamite Corporation, Elmira, N. Y., has entered the fire hose business was recently made by F. T. Van Rensselaer, Vice-President in charge of sales. American-LaFrance and The Goodyear Tire & Rubber Co., of Akron, Ohio, have combined their experience, engineering research and development work, and manufacturing facilities, to develop a complete line of hose for fire department service. The hose will be made exclusively for the American-LaFrance and Foamite Corporation by The Goodyear Tire & Rubber Co. and will be known as American-LaFrance-Goodyear fire hose. The hose will be made in six different grades to fit the needs of all classes of fire department service.



THE NEW WESTERN PORTABLE CRUSHING AND SCREENING PLANT



Send for This

Park Sprayer Catalog

It illustrates and describes the entire BEAN line of power sprayers for park and municipal use, and shows how to protect shade trees and ornamentals from the devastations of pests.
All types and sizes to meet all spraying requirements.

Write for free copy.

JOHN BEAN MFG. COMPANY
Division of Food Machinery Corporation
5 Hosmer St., Lansing, Mich.
105 W. Julian St., San Jose, Calif.

"BEAN" PARK SPRAYERS

HICKORY FIBER for ROTARY SNOW BROOMS STREET SWEEPERS HAND BROOMS

HUNTSVILLE Hickory Fiber for all types of brooms is an unconditionally guaranteed product that will give consistent and economical service over long periods of time—sweeps clean the roughest pavements—handles the heaviest refuse with ease. Each fiber is a live, springy, flexible broom filler made from the best selected green hickory, thoroughly cured, and rigorously inspected.
It will pay you to investigate, write today.

The Huntsville "Trade Mark" on every bale is your guarantee. Look for it.

FAULTLESS FIBER HUNTSVILLE HICKORY FOR STREET SWEEPERS

Write today for the Booklet "The Story of Huntsville Hickory"

FRANK H. FORD, President

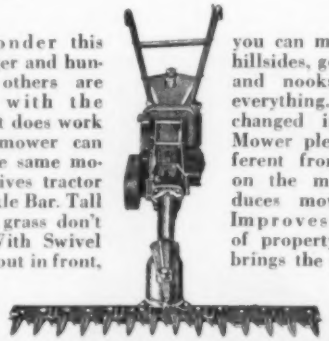
HUNTSVILLE FIBER & VENEER WORKS

HUNTSVILLE ALABAMA

"Gravely Cuts Our Expense 75%!"

. . . says City Manager

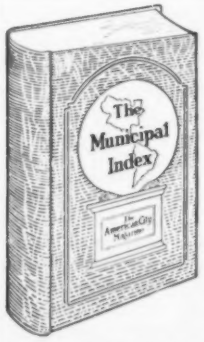
"I find the Gravely cuts our expense of clearing vacant lots 75% as compared to using scythes. The entire unit is very well constructed. We have had but few repairs during the 18 months we've used a Gravely," writes the Manager of a large Eastern city.



It's no wonder this City Manager and hundreds of others are satisfied with the Gravely. It does work no other mower can touch. The same motor that drives tractor powers Sickle Bar. Tall weeds and grass don't stop it. With Swivel Action bar out in front, you can mow steepest hillsides, go in corners and nooks. It cuts everything. Quickly changed into Rotary Mower pleasingly different from anything on the market. Reduces mowing costs. Improves appearance of property. Coupon brings the proof.

WRITE FOR FREE MOWER BOOKLET!

Gravely Motor Plow & Cult. Co.
Box 403, Dunbar, W. Va.
Please send me Free Mower Booklet.
Name .....
Address .....



Stewart FENCES

When Fencing questions arise—consult our 4 pages on Iron and Chain Link Fence in the Municipal Index, or write direct to us for descriptive literature.

See pages 536—768—769—801

THE MUNICIPAL INDEX

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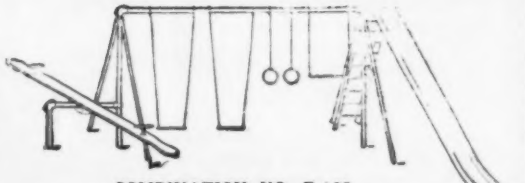
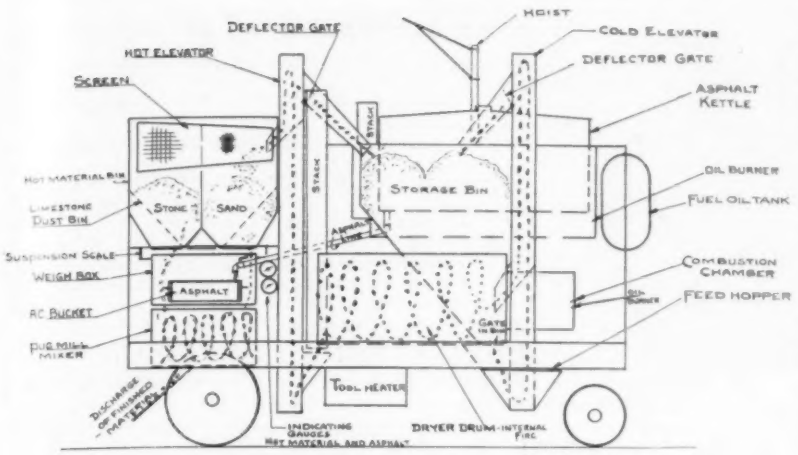
***The* STEWART IRON WORKS CO., Inc.**
813 Stewart Block, Cincinnati, Ohio



COMBINATION NO. E-125
EverWear Playground and Water Apparatus. The recognized standard of safe and permanent value for the playground and swimming place.

Write for New Catalog

The EverWear Manufacturing Company
Box 103, Springfield, Ohio



A CROSS-SECTION OF THE H & B TYPE R-400 ASPHALT PATCH PLANT, SHOWING THE PATH OF MATERIAL THROUGH THE PLANT

A Portable Automatic Asphalt Patch Plant

A portable asphalt repair plant mounted on a trailer and built to give 11 feet 1 inch road clearance is the latest offering of Hetherington & Berner, Inc., Indianapolis, Ind., in its asphalt plants. This type R-400 unit has ample capacity for any patch or maintenance work or miscellaneous paving jobs requiring not more than 400 yards per day. The cold material is fed into the feed hopper and is not touched again until it is discharged from the mixer at the end of the plant. As shown in the diagram, there is one hot and one cold elevator. The dryer drum is heated internally by fuel oil through the combustion chamber.

The flow of material through the plant is from the feed hopper up through the cold elevator to the storage bin, from which the material drops to the dryer drum, discharging into the hopper of the hot elevator. At the top of this elevator the material can be deflected either to the first storage bin or to the screen above the sand and stone hot storage bin, which are directly over the weigh bucket. Asphalt is stored at the front of the chassis and at the top of the plant, the melted material running to the asphalt weigh bucket above the pug-mill. The weigh box and asphalt bucket discharge directly into the pug-mill, which is over the rear axle of the plant. The finished material is discharged from the pug-mill into any kind of transportation unit desired, such as wheelbarrows, or onto a sheet iron tray and from that shoveled to the road.

This plant will mix black base or binder as well as topping material and can also be used for cold mix. The plant is on a rigid steel trailer frame with rubber-tired wheels and conforms to highway and street regulations. Its shipping weight is approximately 16,000 pounds.

An Air-controlled Road Planer

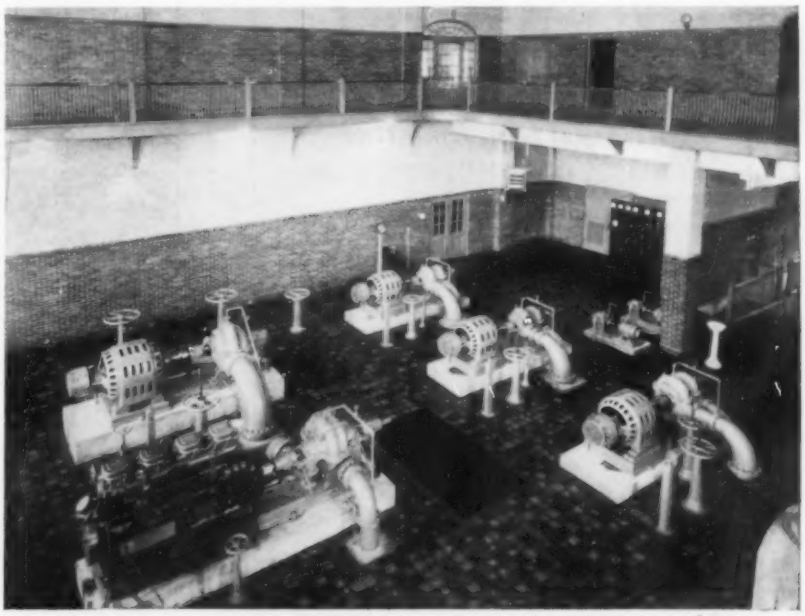
The Pneu-Hydro road planer or conditioner, which is designed for high-speed maintenance work and which is controlled entirely by a low-pressure air system, is manufactured by the Pneu-Hydro Road Machinery Co., Cadillac, Mich. This planer, which is made in an 8-foot size for mounting on 1- to 2-ton trucks, a 10-foot size for 2- to 3-ton trucks, and a 12-foot size for trucks of 3 tons or heavier, will operate at any desired speed as high as 20 miles an hour, although, according to the manufacturer, the best results are secured at speeds of 10 to 12 miles per hour.

All vibration and road shock are absorbed by two sturdy air cylinders. Pressure can be applied to either end of the machine independently of the other end, so that one end of the blade can be used for cutting and the other for spreading. The loose material is spread out before reaching the end of the blade, thus leaving no windrow or ridge along the shoulder or center of the road. The adjustment can be made in 15 seconds from the driver's seat without stopping the truck. For ordinary purposes the maintainer works on 20 to 30 pounds of pressure, although the average pressure carried in the supply tank is 75 to 80 pounds. This is easily maintained by the accumulators, which are of the water-cooled type and very simple in construction, or a suitable compressor. The blade is equipped with a pneumatic lift, making it possible to raise or lower the blade quickly and easily. By using quick release clamps the machine can be reversed to any desired position in about a minute's time, making it possible for the truck to operate with traffic on the road.

A Holding Company for Aerial Photographic Patents

The Institute of Photogrammetry, Inc., has been formed by Norman H. Brock, President of Brock & Weymouth, Inc., 1607 Walnut Street, Philadelphia, Pa., as a patent-holding company in the aerial photographic mapping field. This company has acquired numerous patents relating to the aerial photographic art, including patent No. 1,331,978, which was the basis of the infringement suit brought by Brock & Weymouth against the Fairchild Aviation Corporation and subsidaries. After two years of litigation, the Fairchild Company admitted the validity of this patent and its infringement thereof. A decree was accordingly entered on January 25, 1932, by the U. S. District Court, Southern District of New York, and the Fairchild Corporation has agreed to pay royalties and settle the claims for past infringement.

Both Brock & Weymouth, Inc., and Fairchild Aerial Surveys, Inc., have taken licenses under all the patents owned and controlled by the Institute of Photogrammetry, Inc.



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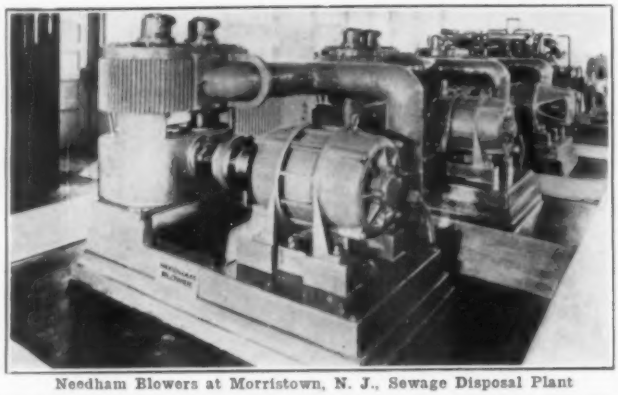

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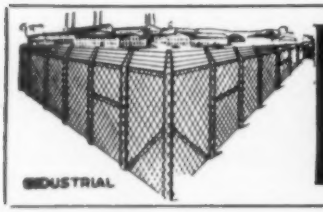

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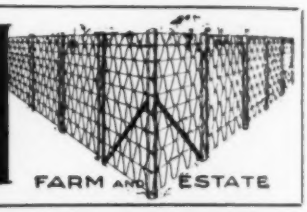

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Easily laid at small expense with perfect flow line

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Home folks will like this hotel

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NEW YORK

THE GRAVELY MOWER WORKING ON A STEEP SLOPE

A One-Man Tractor Mower

A mower which combines the sickle and rotary type mower with a garden tractor has been developed by the Gravely Motor Plow & Cultivator Co., Box 201, Dunbar, W. Va. With the Gravely garden tractor for power, either a sickle or a rotary mower may be attached to the swiveled arm which permits the mower to follow the contour of the ground no matter what the angle. The sickle bar mows tall weeds and grass over rough ground and steep hillsides, for it is out in front of the tractor, which can be readily turned around corners and against trees and other obstacles.

The weight of the unit is balanced on a single wheel affording leverage for easy handling. The sickle unit cuts a 39-inch swath, and besides mowing, the tractor unit with proper accessories may be used to plow, harrow, seed or cultivate.

A Portable Power Tar and Asphalt Emulsion Sprayer

A great deal of resurfacing and repatching work is now being done by cities to preserve older pavements which have literally worn out but which still can furnish adequate foundation for heavy traffic. The Hauck Manufacturing Co., 126-134 Tenth Street, Brooklyn, N. Y., has developed a power sprayer for use with cold tar or asphalt emulsion, which can be readily moved around by one man and which is capable of spraying bituminous material over an area of 600 to 700 square yards of pavement per hour.

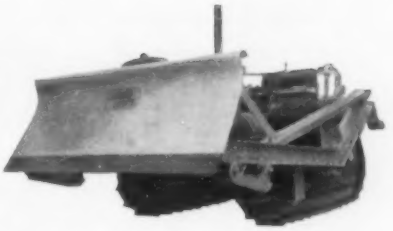
The power unit eliminates the need of a man at the hand-pump and also provides a steady pressure of 45 pounds, making the machine about twice as fast as with hand pumping. The bituminous material usually has to be pumped from the shipping drum into the sprayer tank, but with the Hauck machine this is done by the power unit with the aid of a special filling attachment and takes only about 5 minutes per drum.

The machine is equipped with a ½-horse power combination gas engine compressor unit. This generates pressure in the 60-gallon tank, which is equipped with a pressure gage and safety valve, and forces the tar or emulsion to the spray nozzle. Before leaving the tank, the material passes through a basket strainer to eliminate clogging in the pump, and is delivered through the 25 feet of pressure hose to the 6-foot spray bar. A special rotary spray nozzle and spring trigger valve permit ready control of the flow of the material and its uniform distribution on the road surface. The sprayer is equipped with 32-inch diameter roller-bearing steel wheels and a lock-box cover for the engine. It may be equipped with rubber-tired wheels if desired.

THE HAUCK POWER EMULSION SPRAYER

A Hydraulic Operated High-Lift Bulldozer

A new bulldozer in which the blade can be lifted 33 inches above the level of the ground on which the tractor crawlers are running has been announced by LaPlant-Choate Manufacturing Co., Inc., Cedar Rapids, Iowa. Other features of this bulldozer are a new main frame design and high-lift mechanism at the rear of the tractor which allows the blade to drop 18 inches below the track ground line as well as raising it nearly a yard above. The Hylift bulldozer has a



THE NEW LA PLANT-CHOATE HYLIFT BULLDOZER

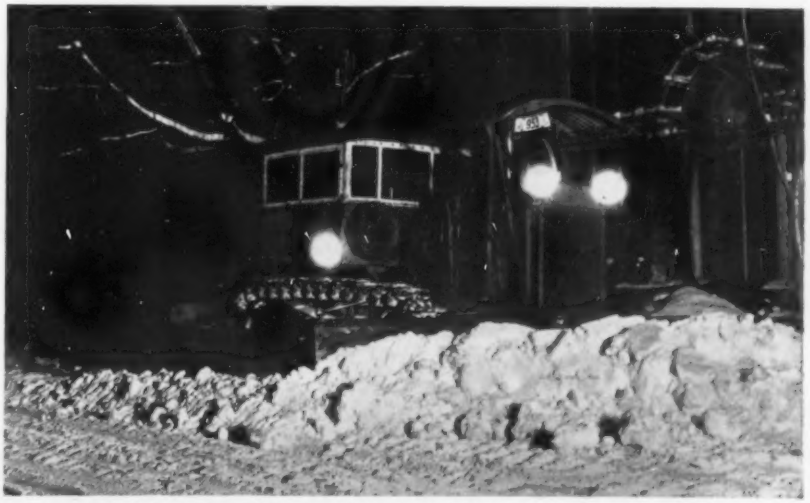
double-acting jack which forces the blade into the ground or quickly pulls it out in the hardest going. It is a unit with the blade and jack, which are built compactly to the tractor to facilitate its use in close quarters. This is an important factor in many operations where squeezing a tractor and bulldozer through a narrow cut saves a lot of travel and speeds up the job. The tractor drawbar is left entirely clear so that it may be used for hauling wagons or other equipment without removing the bulldozer. The complete ground clearance when the blade is raised prevents the unit from high-centering on the bulldozer main frame.

New Size Caterpillar

Caterpillar Tractor Co., Peoria, Ill., has announced a Model Sixty-Five, a step-up in size from the familiar Sixty. At the same time, a price reduction of about 10 per cent in the price of the recently announced Thirty-Five has been made.

Blaw-Knox Co. Makes Agreement with Western Pipe & Steel Co.

Blaw-Knox Co. and the Western Pipe & Steel Co., of San Francisco and Los Angeles, have closed an agreement whereby Western Pipe & Steel Co. will manufacture Blaw-Knox products on the Pacific Coast and will sell through the organization of a new company to be known as Blaw-Knox & Western Pipe Corporation. This new concern will be equally owned by the two companies.



A CATERPILLAR SIXTY WITH A LA PLANT-CHOATE ONE-WAY BLADE REMOVING SNOW IN SALT LAKE CITY, UTAH, AT NIGHT

Outdoor Lighting

A Section of *The American City*
Devoted to the Lighting of Streets, Highways, Bridges, Airports, Athletic Fields and Parks, and the Floodlighting of Public Buildings

Progress in Airport Lighting

MUNICIPAL airports, although fewer in number than commercial ones, include more that are provided with sufficient equipment to be classed by the Department of Commerce as "lighted," than is the case with commercial airports. As announced by the Aeronautics Branch of the Department, on March 1 the number of lighted municipal fields was 189, or 30 per cent of the 637 municipal ports. Lighted commercial airports numbered 129, or 19 per cent of a total of 670. The greatest number of lighted ports was among the Department of Commerce intermediate fields, or 375 out of 398—over 94 per cent. For all airports, including Army, Navy, auxiliary, state, private and miscellaneous, the proportion lighted was 727 out of 2,113, over 34 per cent.

Three years previously there were 60 lighted municipal airports, according to the Department of Commerce list for Jan. 1, 1929. Lighted commercial fields numbered 19. Although the current figures show a notable increase, there is still great room for improvement. The usefulness of any general-purpose airport, municipal or commercial, is greatly cut down if restricted to daylight hours, as against 24-hour availability, whether for scheduled or convenience flying or in case of emergency.

American methods of airport lighting, with recommendations for approved practice, were reviewed in a report of the Illuminating Engineering Society Subcommittee on Airport Lighting, published in the February *Transactions* of the I.E.S. The author is K. W. Mackall, chairman of the sub-committee, the other members of which were P. R. Bassett, S. G. Hibben and H. E. Mahan.

The separate kinds of airport lighting equipment are discussed in the report, with descriptions of various specific types and comments as to proper location and operation. Government requirements are kept in mind, particularly with regard to the Department of Commerce ratings as to lighting. In the headings of the following brief excerpts the various ratings (A to E, inclusive) for which each class of equipment is necessary are indicated. The accompanying photographs and drawings are from the report.

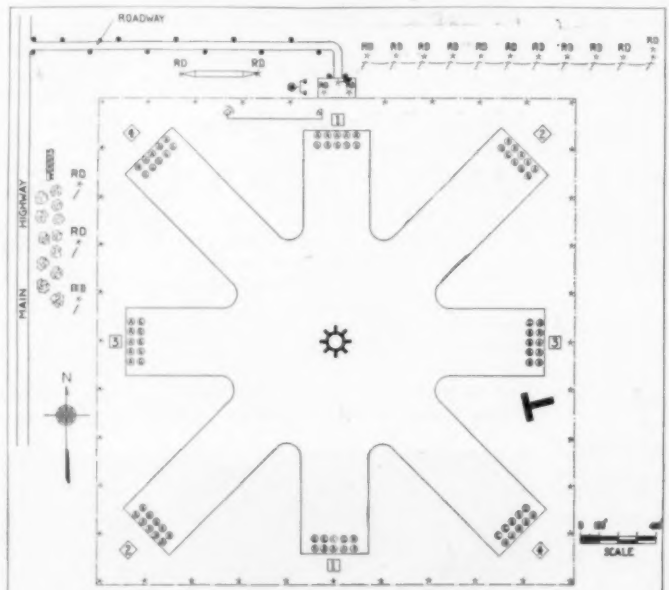

ROADWAY
MAIN HIGHWAY
RD
N
SCALE
LEGEND
REVOLVING BEACON & SUPPLEMENTARY CODE BEACON.
CEILING LIGHT & INDICATOR.
BOUNDARY LIGHT.
RUNWAY LIGHTS (AUTOMATICALLY OR MANUALLY SWITCHED TO INDICATE PROPER RUNWAY AND DIRECTION OF APPROACH).
GREEN (APPROACH) AMBER (OPPOSITE END TO APPROACH).
OBSTRUCTION LIGHT.
ILLUMINATED WIND CONE.
WIND TEE.
AIRPORT FLOODLIGHT (SINGLE LARGE UNIT OR GROUP OF SMALL UNITS).
TYPICAL ARRANGEMENT—STATIONS 1-1, 2-2, 3-3 AND 4-4.
SEE TEXT FOR MORE COMPLETE OUTLINE OF PRACTICE.
LIGHTING STANDARD.
FLOODLIGHTING FOR MARKINGS ON HANGAR ROOF.

DIAGRAM OF AIRPORT
SHOWING LIGHTING FACILITIES
(SEE TEXT FOR DESCRIPTION OF EQUIPMENT)

AIRPORT BEACON (A, B, C, D, E).—The airport beacon serves to guide the pilot to the airport. The most satisfactory airport beacon for general service used to date is the rotating type giving a flash at frequencies of ten seconds or less. The one most generally used is the so-called 24-in. beacon used by the Airways Division of the Department of Commerce. This beacon, shown in Fig. 1, consists of 25¼-in. diameter, 10-in. focal length, crystal glass parabolic reflector of commercial grade accuracy, mounted in a cast silicon-aluminum weatherproof housing.

The light source of this beacon is a 1000-watt, 115-volt, T-20 bulb, Mazda lamp, with C-13A filament and mogul base, which has a lumen output of 19,500, and a maximum apparent beam candlepower of approximately 1,000,000.

Some airports, desiring a beam of somewhat higher candlepower use the same beacon with a 30-volt, 1000-watt, T-20 bulb Mazda lamp having a C-13 filament with mogul screw base.

The Department of Commerce has recently designed another rotating beacon for use along airways and at airports. This new beacon, 36 inches in diameter, is shown in Fig. 2.

AUXILIARY CODE BEACON (A, B, C, D, E).—When the main airport beacon is white it should be accompanied by an auxiliary code beacon, aviation green in color. This auxiliary code beacon is flashed by means of a cam and mercury switches mounted on the airport beacon, or by a separate flasher. The flash is in International Morse Code and serves to identify the airport, which is particularly necessary where there are several airports in a city.

FIGURE 1

Department of Commerce standard 24-inch rotating beacon with zenith light panels, 25-degree upward deflecting lens, and lamp changer

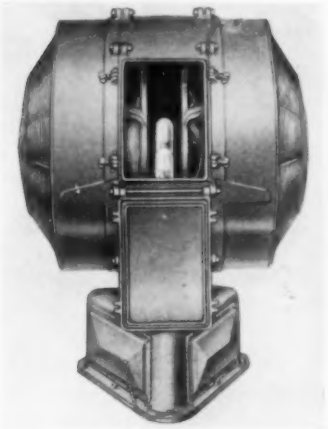


FIGURE 2

Department of Commerce standard 36-inch double-ended rotating beacon. Semaphore and doublet lens combinations, with lamp changer, using prefocused base lamps

FIGURE 3

Typical series boundary lights
Left, with refracting globe
Right, with plain globe

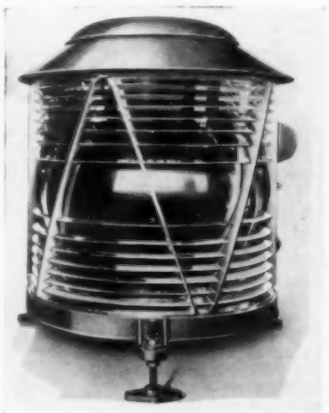


FIGURE 4

Field floodlight, 1,000-mm. dioptric lens with 150-ampere full automatic arc

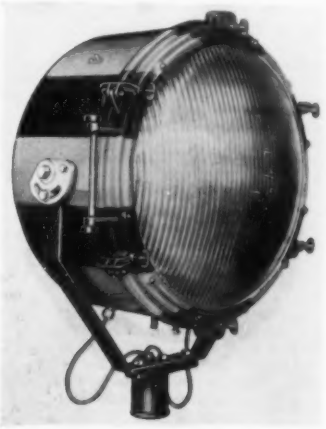


FIGURE 5

Field floodlight, 24-inch diameter, 10-inch focus glass parabolic reflector with 3,000-watt, 32-volt lamp

FIGURE 6

Field floodlight, one 36 x 15-inch plano-parabolic reflector with two 1,500-watt, 32-volt lamps

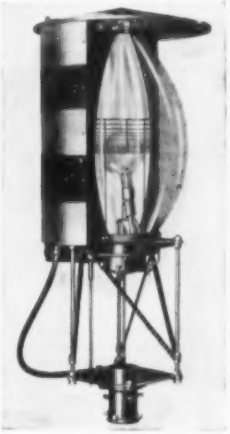


FIGURE 7

Field floodlight, 12-inch focus parabola of revolution with 5,000-watt, 115-v. lamp

FIGURE 8

Field floodlight, 500-mm. dioptric lens with 3,000-watt, 32-volt lamp

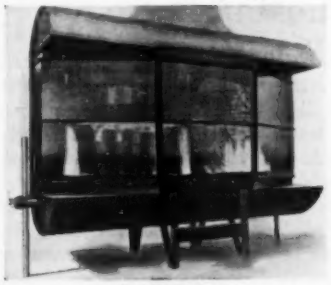


FIGURE 9

Field floodlight. Six 36 x 15-inch plano-parabolic reflectors with eight 3,000-w., 32-v. lamps

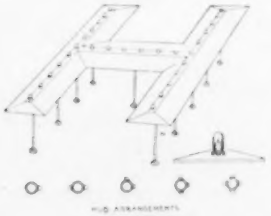


FIGURE 10

Lighting of raised roof-marking letter

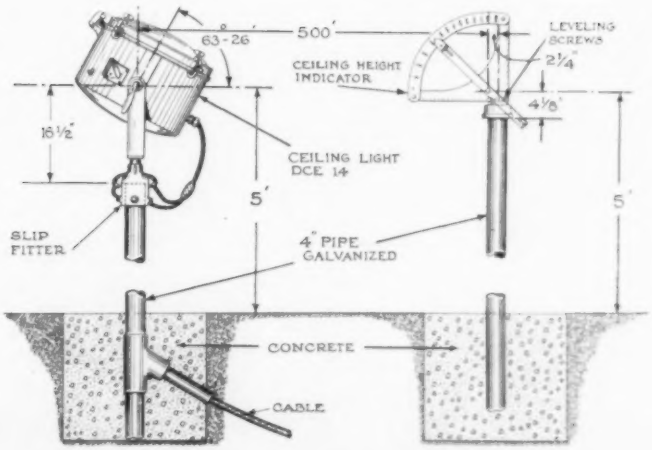


FIGURE 11

Method of installing ceiling projector and ceiling height indicator for reading height of ceiling in feet

The Department of Commerce has designed an auxiliary code beacon. This consists of two 330 mm. diameter Fresnel lens sections. The lower lens of the beacon consists of three 120-degree sections of a Fresnel lens mounted on a suitable holder. At the focal point of the lenses there is mounted a 500-watt, 115-volt C-7A filament lamp in a PS-40 bulb with a mogul screw base. The upper lens, made in two sections, also has a 500-watt lamp. See Fig. 12.

Boundary Light System (A, B, C, D, E).—The outline of the entire area available for landing shall be shown at night by boundary lights, so that a pilot in the air may know the shape and extent of the landing field. The Department of Commerce recommends a maximum spacing of 300 feet. This committee believes that a better indication of the landing area will be given if the spacing is less than this maximum and it feels that the spacing should not exceed 250 feet.

A boundary light consists of a lamp and receptacle mounted in a bronze or aluminum housing, and enclosed in an outer globe, clear or amber in color, the entire unit being weatherproof. Both clamp and screw globes are used. Typical boundary lights are shown in Fig. 3.

Boundary lights are usually mounted on pipe standards, imbedded in the ground. Boundary lights should be kept low, not to exceed three feet to the light source, except where the airport is fenced, when they should be slightly higher than the top of the fence.

A collision of a plane against a boundary light standard will often do considerable damage to the plane and will often break the underground circuit to the boundary light. To lessen the damage as much as possible, disconnecting boundary lights are recommended.

Where the entire field is not available for landing in all directions at all times, green approach lights shall be so placed in the boundary light system as to indicate clearly the ranges of each strip or runway.

Temporary field obstructions, such as soft ground, should also be indicated by red lights in the boundary light circuit.

Obstruction Lights (A, B, C, D, E.).—Obstruction lights for marking obstacles to air navigation are in general similar to the boundary lights shown in Fig. 3.

All obstructions on or in the vicinity of an airport, including all buildings, structures of any kind, trees, etc., must be clearly marked with red lights, equal in wattage, lumen output, and candlepower as specified for green approach lights in the boundary light circuit.

Suitable weatherproof units shall be mounted above the highest point of the obstruction or on poles of corresponding height beside the obstruction. Obstruction lights shall be placed on a separate circuit, either series or multiple, except when they are included in the boundary light circuit.

Illuminated Wind Direction Indicator (A, B, C, D, E).—For indicating the wind direction at night, either the wind-cone (sock) or the wind-tee should be used. Since the wind-cone is better for the take-off and the wind-tee better for landing, both should be used.

The proper illumination of both wind-cone and wind-tee is essential to night flying. The wind-cone may be satisfactorily illuminated by four 100-watt, 115-volt lamps in PS-30 bulbs, mounted in deep bowl porcelain enameled reflectors at a sufficient distance above the wind-cone to insure complete coverage.

Night-lighting of the wind-tee is accomplished by outlining with incandescent lamps of at least 25 watts mounted in weatherproof housings having green enclosing globes, spaced on 6- to 12-inch centers. Some wind-tees are outlined with gaseous tubes, preferably green in color. Sometimes both red and green lights are used on wind-tees for signal purposes; green indicating to a pilot in the air permission to land, and red indicating no landing.

Ceiling Projector and Ceiling Height Indicator (A, B, C).—A ceiling projector, used for measuring the height of low-hanging clouds, is essentially a small searchlight having a narrow angle of beam divergence.

The usual form of ceiling projector is 12 to 18 inches in diameter, precision-grade, glass parabolic reflector, mounted in a weatherproof casing, using 250- to 1,000-watt lamps. Circular louvers cutting off all spill-light should be used.

The projector is usually mounted at a definite distance from the control room and directed upward at a definite angle. The height of the cloud in feet is read directly by the ceiling height indicator or alidade, mounted in or immediately outside the operations office (Fig. 11).

FIGURE 12
Department of Commerce standard auxiliary flashing code beacon with double light source

Landing Field Illumination (A, B).—American practice in landing field illumination has been governed largely by the minimum requirements and recommendations of the Department of Commerce, and very few airports have exceeded these requirements. The constant increase in night flying, in both mail and passenger service, makes this phase of airport illumination doubly important.

The present recommendations of the Department of Commerce call for a minimum intensity of 0.15 foot-candlepower for an "A" rating, measured at each point on the vertical plane of maximum intensity. The committee feels that this minimum should be increased to 0.25 foot-candle.

Floodlight projectors must be mounted as low as possible consistent with the contour of the land area, but the mounting height must be great enough to insure good ground illumination. The tendency has been toward too low mounting heights, from 6 to 15 feet feet, resulting in high intensity foreground illumination and a rapid falling off in intensity on the far side of the field. The committee feels that the minimum mounting height for large field floodlights should be increased to at least 10 feet.

On "L" and "T"-shaped fields using a distributed system of illumination, with smaller floodlights, the mounting heights should vary from 6 to 12 feet.

There are quite a large number of different floodlight projectors available. Illustrations of those most commonly used are given in this report.

This committee makes no recommendations as to the preferred type of installation, beyond the general one of sufficient light, even distribution and accurate light control. No one type of floodlight is suitable for all conditions. The final selection is to be governed by lighting requirements, size, shape and contour of the landing field, the amount of traffic and the money available.

Roof Markings (A, B, C).—In order that a pilot may lose no time in identifying the airport, the name of the airport and the city or town shall be placed on the roof of at least one outstanding airport building and illuminated at night. Satisfactory illumination is obtained by using 10-watt or 15-watt sign lamps placed in the center of the stroke. For 6- to 11-foot letters the lamp spacing should not be more than 6 inches; for 12-foot and larger letters the spacing should not be more than 10 inches. If gaseous discharge tubes are used they should be either the 11 mm. diameter by 18 milliampere or 15 mm. diameter by 25 milliampere. The installation should, of course, be of good weather-proof construction.

Roof signs may be attached directly to the roof, but since an accumulation of snow will render this illegible, it is advisable that the letters be raised a foot or more above the roof, making the letters of sheet metal as shown in Fig. 10, with gently sloping sides.

In addition to this night lighting equipment, the following equipment is recommended by the Department of Commerce and is considered necessary for proper handling of night traffic:

a. Illumination of at least one building on top and four sides for perspective.
b. Illumination of the loading area.
c. Illumination of hangar aprons.
d. Illumination of taxi-ways.

Modern Lighting on a Windsor, Ont., Thoroughfare

THE Street-Lighting Code of the Illuminating Engineering Society was followed in planning new lighting installed in 1931 on several streets in Windsor, Ont., according to W. A. Shaw, Assistant Engineer, Windsor Hydro-Electric System. The installation on Tecumseh Road, one of the main thoroughfares, is set forth in detail by Mr. Shaw in *The Bulletin* of the Hydro-Electric Power Commission of Ontario. This street has a width of 54 feet between curbs, with the roadway divided in two by an 18-foot strip in the center, broken up into "islands." The old lighting and distribution system, and that which replaced it, are described as follows:

"Before the new lighting was installed, there was a wooden pole line along the south side of the street, with ordinary bracket lighting. Along one-half of this south side, there were 45-foot wooden poles carrying a 26-kv. line, two 4-kv. lines, several series wires, and a Hydro telephone line. All these wooden poles and series wires have been eliminated from the street.

"On both sides of the street, Union Metal heavy-duty fluted steel poles varying in height from 26 to 50 feet, and with bottom shaft diameters from 9 to 12 inches, are now used. These poles have a 17-inch square cast steel base which is mounted on a concrete foundation, by means of four anchor rods. The bolt circle is 16 inches. This has been made standard for all sizes of poles and styles of bases. With this standard bolt circle, it will be possible to change to different poles if necessary, without changing any foundations. All steel poles from 26 feet up to 40 feet, are in one section, and are made of No. 7 gage steel. The 45-foot and 50-foot poles are in two sections, with the bottom section of No. 3 gage and the top section of No.

7 gage. Where street lighting alone is provided for, 26- to 28-foot poles are used, but where the 26-kv. and 4-kv. lines are provided for, 40-, 45- and 50-foot poles are used. The spacing of all poles is approximately 120 feet, and the arrangement is opposite. This spacing, if street lighting alone was considered, could have been increased to about 150 feet.

"Street-lighting units are installed, one on every pole, at a mounting height of 21 feet. Each lighting unit consists of a Form 32 Novalux pendent luminaire, mounted on an ornamental cast iron bracket overhanging the curb. The lamps used are 20-ampere, 6,000 lumens, with a light center of 7 inches, and burning base up, in a No. 146 light alabaster rippled C.G.E. globe. The lumens per linear foot of street are 100 to 120. Higher intensities can be obtained merely by changing the lamps to a higher rating. Provision has been made on each pole for the addition of a second bracket to give future twin lighting.

"Current is supplied from two 20-kw., 20-ampere constant-current outdoor regulators, one for each side of the street, but mounted off the street. An overhead series wire is used, and is carried on an ornamental steel arm, where it is broken on a double groove insulator. From here, duplex cable is taken on the inside of the pole and bracket to the lamp socket. These 20-ampere circuits have a maximum of 1,000 volts, approximately one-third of the voltage of a 6.6-ampere circuit. This system is found to be economical and very satisfactory. The initial cost of underground cable and individual transformers is saved. The losses from these transformers are also eliminated."

NEW LIGHTING UNITS AND STANDARDS ON TECUMSEH ROAD, WINDSOR, ONT.
40-foot poles on left, 26-foot on right

Improved Lighting System in New England Town Center

By A. G. SIAS
Manager, Municipal Light Department, Reading, Mass.

BEFORE
and
AFTER
Reading Square with the old electric light poles and overhead wires, and after the new lighting system was installed

THE town of Reading, Mass., a community of about 10,000 people, has recently installed underground ducts and cables and removed the overhead wires and wood poles in the town center.

In connection with this improvement a new street-lighting system was installed, consisting of 46 Form 32 General Electric Novalux pendent units and 10,000-lumen lamps equipped with No. 162 medium alabaster rectangular globes. The units are suspended from 5-foot aluminum brackets with ornamental scroll, all screws, bolts and nuts being of non-rusting metal. The brackets are supported by concrete standards, made by the American Concrete Marbelite Co., of Chicago. The light center is 20 feet above the surface of the street, with average spacing of about 100 feet. The standards on opposite sides of streets are staggered in relation to one another.

A G.E. porcelain cut-out is installed in the base of each lighting standard for convenience in testing and cutting the post out of the circuit in case of trouble. The series circuit to which the lamps are connected is controlled by a Westinghouse constant-current regulator with the secondary coil wound for 20 amperes, which makes it unnecessary to use current transformers for each lamp.

The photographs show the old and new appearance of Reading Square.

Use Street Lighting to Prevent Crime

THE expenditure of most cities for street lighting is far too small in relation to the immense importance of lighting as the most effective method of preventing crime.

Correct lighting is a guardian of person and property. In the measure that city authorities appreciate its police power—*in the measure that they use street lighting to prevent crime*—they realize a return that is great in comparison with the moderate cost of the lighting.

Of course, the illumination should be *engineered*. General Electric lighting specialists are qualified to recommend intensities, spacing, and luminaires that will best meet your safety requirements. They can assist you to formulate budgeting plans that will enable you to maintain your street lighting on a scale proportionate to its importance.

Write the nearest G-E office; or Incandescent Lamp Department, Nela Park, Cleveland, Ohio; or Lighting Division, General Electric Company, Schenectady, N. Y. for the service of a specialist—and use street lighting to prevent crime.

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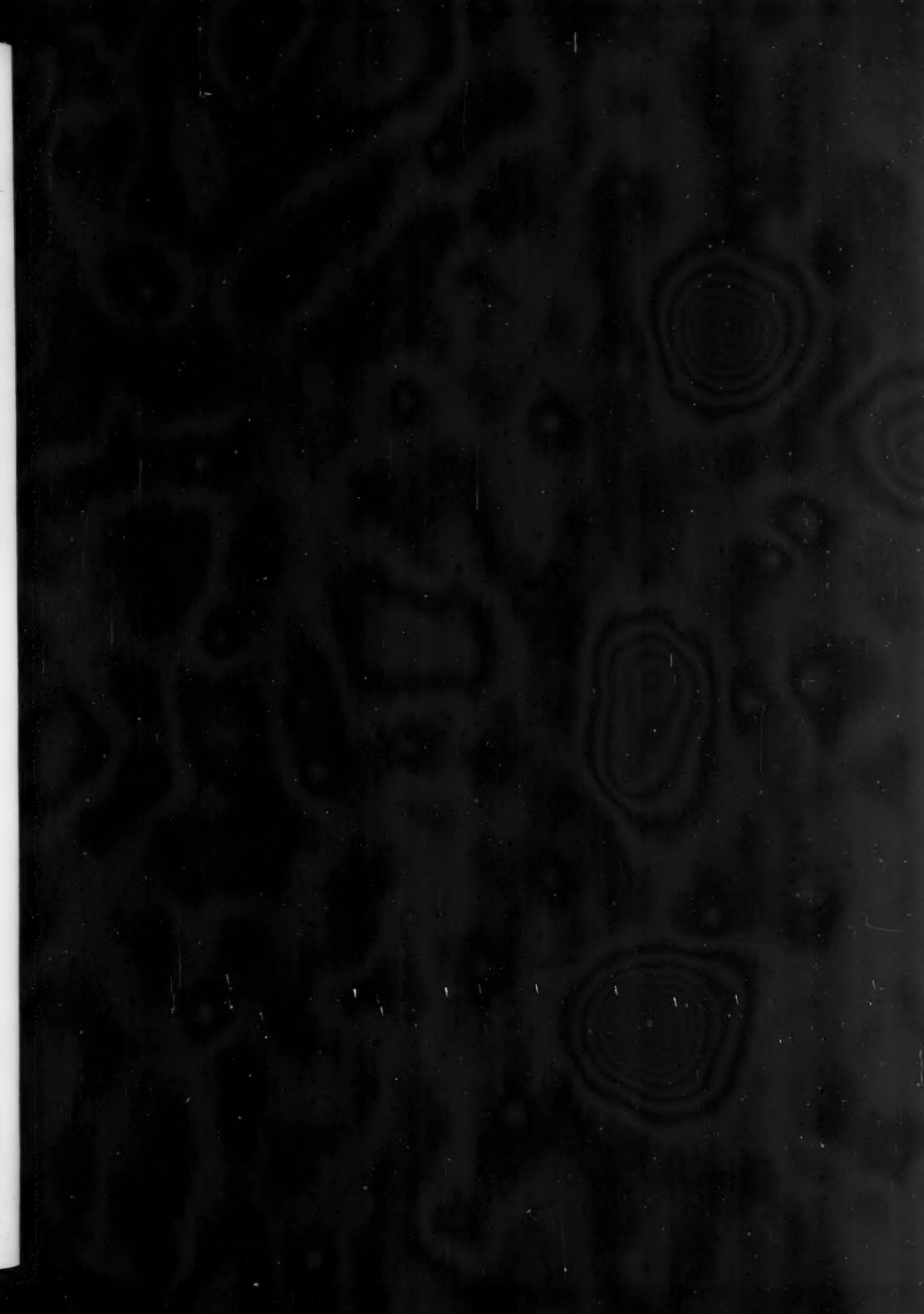
GENERAL ELECTRIC



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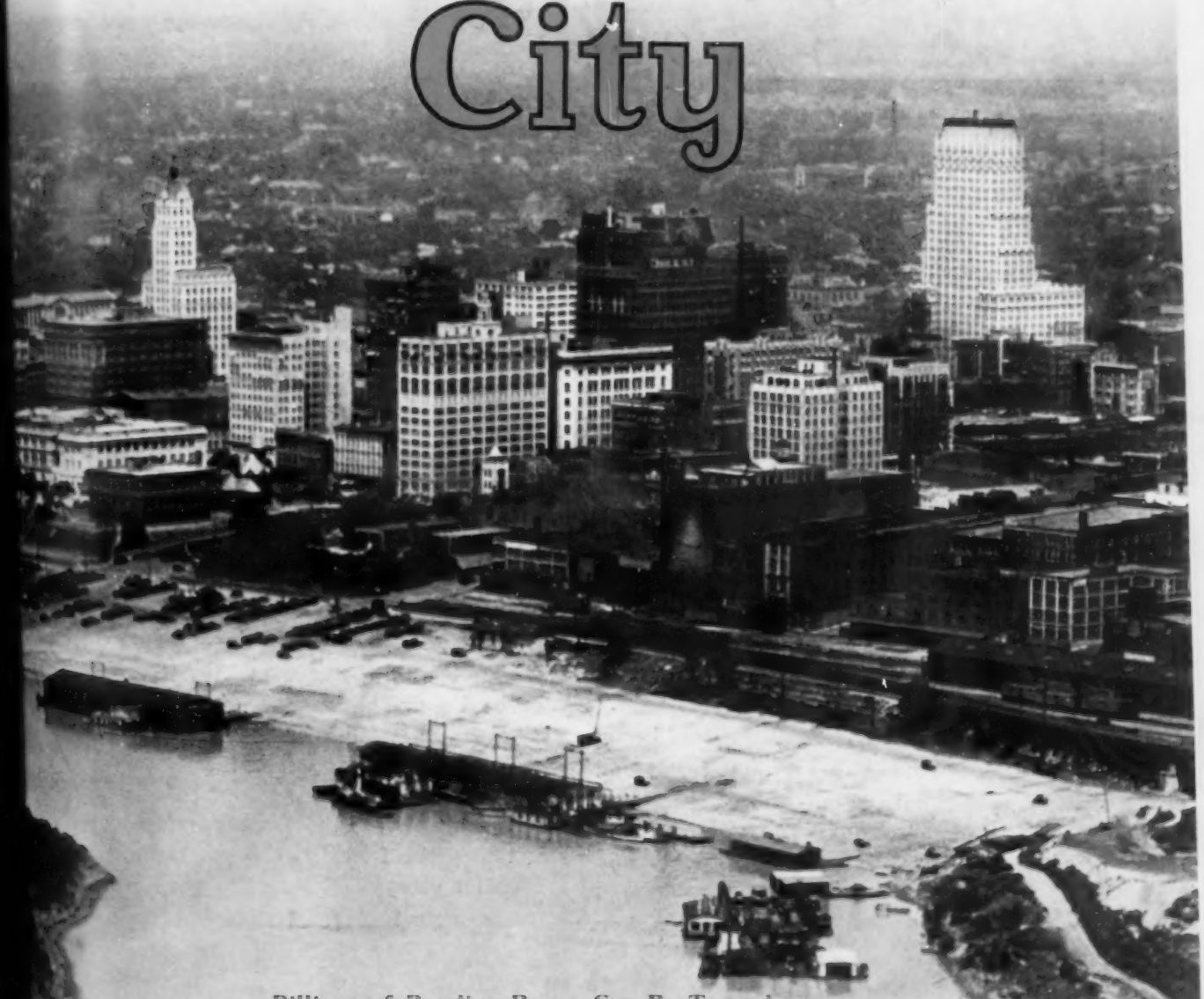

Billions of Bonding Power Can Be Tapped for Beneficial Public Works

In a rapid release of the now pent-up streams of public works construction lies the chief hope of providing power for the idle wheels of industry. All too clear is the tragic absurdity of supposing that business can restore its sales by forcing governmental units to reduce their purchases.

The time has come for concerted, courageous action by all our public bodies—local, state and national—in the completion of plans, the voting of bonds and the awarding of contracts for public improvements which will not only substitute jobs for doles, but will add to property values and to the ease with which future taxes can be paid.

Many cities, as shown by the New York State figures on page 85 of this issue, have large reserves of borrowing power which can be tapped in the present emergency. Others may require help from their state governments in financing loans. And the Congress of the United States, if it is to show real statesmanship, will speedily authorize no less than three billion dollars of Prosperity Bonds, to be spent directly by the Federal Government or for the stimulation of local activities through the purchase of state and municipal securities.

Thus may the construction of needed public works become a major factor in the alleviation of needless public misery.